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VOLUME XXXVIII.

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A NORTH AMERICAN ENTOMOLOGISTS' UNION.*

BY HENRY H. LYMAN, M. A., MONTREAL.

When seven years ago I had the honour of occupying the Presidential chair of this Society, I ventured in my annual address, as some of you will doubtless remember, to suggest the formation of a North American Entomologists' Union on similar lines to those on which the American Ornithologists' Union has been so successfully carried on; and in my second address the following year I again returned to the subject. I hoped that the idea would be taken up by some of the leading entomologists of the continent, but though the matter has been, I believe, the subject of correspondence among a number of entomologists, nothing of a tangible nature has, apparently, resulted.

Last year when in New York I was told that a move had been made, and that I would soon receive a circular about it, but on a subsequent visit this year I was told that owing to certain local jealousies the matter had been, at least temporarily, abandoned.

It therefore appears to me opportune, as the original proposer of the scheme, to again bring it before our Society, and through it before the entomologists of the continent.

One thing which caused my thoughts to be again turned to this subject was the reading of the very admirable article on Entomological Literature by Mr. C. F. Baker, in the October number of "Entomological News." If all our writers would use the same restrained and courteous manner there would be no excuse for bickering and ill feeling among entomologists. I entirely agree with Mr. Baker that having so many publications devoted to general entomology, so that any student in any branch has to refer to all of them, is a great evil and a hindrance to the progress of original research in special lines; but while it is easy to see the evil, I fail to see how it can be remedied except by the co-operation of entomologists in a Union such as I have suggested.

*Read at the Annual Meeting of the Entomological Society of Ontario, Guelph, Oct. 19, 1905.

I therefore desire to put before you very briefly some ideas which have occurred to me on this subject, in the hope that they may prove of interest.

In the first place full membership must be limited, as in the case of the Royal Society of Canada, in order to make it a mark of distinction, and so a coveted reward for eminence. But how is the selection to be made without probable injustice to some and the certain wounding of the susceptibilities of many?

Do not attempt it. Begin with Associate Members only, which all North American entomologists should be invited to become, and when you have secured a goodly number, say not less than one hundred, have a ballot by mail for a certain number of full members, no one to be chosen as such unless he receives at least a majority of all the votes cast.

Fix a limit to the full membership, but do not try to fill the limit at once; let us feel our way and grow gradually, but once the limit has been reached do not elect any more full members, except to fill vacancies which may occur.

It would be well to set a moderate limit at first, as it would always be possible to vote to enlarge the limit should it be found too restricted, but it would be a very difficult matter to reduce the membership should it be found to have been made too large in the first instance.

On the other hand, it should not be made too small, lest the cry of "clique" be raised against it.

The happy mean should be aimed at in order that no one who had not attained to some eminence should be a full member, so that membership would be considered an honour.

I would also suggest having a limited number of honorary memberships to be voted to men of eminence in the science, but who through age or infirmity were no longer able to continue active scientific work.

No question of amateur or professional should enter into the matter. An amateur who attains to eminence in the science is, I claim, more entitled to honour than a man to whom it is a profession by which he earns his living.

When a sufficient number of members have been elected, they should come together in an Annual Meeting and organize the Union, electing the first officers, and at this point great care should be taken to secure officers who would be universally acceptable.

The initial stage of every undertaking is often the most critical, and in this case it is most important that there should be no appearance of the Union being especially identified with any one locality, but that all sections of the continent should be fairly represented.

More than that, however, is needed in order to render the scheme a success, and one of the things of most vital importance is a comparatively full attendance of members at the annual meetings or conventions. Failure to attend three consecutive annual meetings should be considered to constitute resignation of membership, and the seat of such member should be declared vacant and filled by election from among the Associate Members.

I have not yet touched upon the financial side of the question, although that is very important. Unfortunately, some entomologists of eminence are not very liberally paid, and have little or no private means, and yet unless the majority of members attended the annual meetings the Union would prove a failure. Most of the entomologists who would be members are, I suppose, in official positions, and we might reasonably expect that at least a portion of their expenses in attending the meetings would be borne by the institutions with which they are connected.

Whether it would be possible to secure some sort of endowment from one of the multi-millionaires of the continent I do not know, but it might be worth attempting.

I have not in this paper made any reference to the matters with which such a Union would deal. Some of these I suggested in my two presidential addresses, and many others will readily occur to any one giving the subject the slightest thought.

The great thing is to secure co-operation among the principal workers in the science, and to eliminate all things which tend to dissension and discord. If I could be of any assistance in the organization of such a Union, I should be happy to do all I could.

DR. WILLIAM SAUNDERS, C. M. G.

His many friends in Canada and elsewhere will join with us in offering very hearty congratulations to Dr. William Saunders upon the distinguished honour that he has received from our gracious Sovereign King Edward, in being made a Companion of the Order of St. Michael and St. George. This honour is conferred only upon those who have rendered eminent service to the Empire in some capacity or other. Few men assuredly have done more for Canada than the Director of the Experimental Farms of the Dominion in advancing and improving agriculture and fruit-growing in all their departments throughout the length and breadth of the land, and especially in the Northwest Provinces. We trust that Dr. Saunders will be preserved in health and strength for the performance of his varied and arduous labours for many a year to come.

SOME NEW SPECIES OF HALICTUS.

BY J. C. CRAWFORD, DALLAS, TEXAS.

In the following descriptions the term sericeous or sericeously roughened is applied to the silky lustre induced by the minute striation or roughening of the surface.

Halictus Fedorensis, n. sp., ♀.—Black, head and thorax closely, finely punctate, clothed with rather abundant whitish pubescence; facial quadrangle longer than broad; clypeus shiny, sparsely punctured; antennæ obscurely ferruginous beneath toward apex; mesothorax sericeously roughened, median and parapsidal grooves obscure; base of metathorax sericeously roughened, finely striate, the striæ not reaching apex medially; wings hyaline, nervures and stigma light testaceous; legs obscurely ferruginous, hind inner spur with four very oblique teeth; abdomen sparsely pubescent, base of segments two and three with lateral hair patches; segments closely, finely punctate; broad apical margins testaceous.

Length, 7 mm.

Two specimens from Fedor, Texas, June 1, 1898; Nov. 11, 1897. Rev. G. Birkmann collector.

In appearance most like *arcuatus*, *aberrans*, *galpinsiæ*, but differs from all of them by the closely-punctate first abdominal segment.

Halictus Robertsoni, n. sp., ♀.—Black, clothed with white pubescence, and appearing powdery; form narrow; head and thorax very closely, finely punctured, clypeus sparsely so; facial quadrangle longer than broad; flagellum obscurely ferruginous beneath; mesothorax sericeously roughened; disc of scutellum almost impunctate; truncation of metathorax heart-shaped, surrounded by a salient rim; from the upper lateral edges of this carina salient carinas run forward, making a triangular enclosure on the base of the metathorax; enclosure very shiny, rather coarsely irregularly rugose; all of metathorax except enclosure covered with close pubescence; tegulæ large, dark, with a light centre; wings smoky, nervures and stigma dark brown; legs black, hind inner spur with about six teeth, the basal three long; abdomen shiny, with short, rather thin whitish pubescence; segments, except apical margins, closely, finely punctured; bases of segments two to four with bands of white appressed pubescence, showing only as lateral hair patches if the abdomen is contracted.

Length, about 7 mm.

Type, Victoria, Texas, Febr. 24, 1904. Crawford collector.

Most closely related to *nelumbonis* in the appearance of the metathorax, but is easily separated from that species by the much finer punctuation of the mesothorax.

Dedicated to Mr. Charles Robertson, whose excellent descriptions and notes on Illinois bees are of great value.

Halictus Birkmanni, n. sp., ♀.—Black, shiny, clothed with short, glittering, white pubescence; facial quadrangle about square; face above antennæ with close but well-separated fine punctures; clypeus and mandibles ferruginous; antennæ beneath, including scape, testaceo-ferruginous, above dusky ferruginous; mesothorax sericeously roughened, finely, sparsely punctured; metathorax finely irregularly rugulose, not reaching apex, behind this roughened, as are the pleura; tegulæ, tubercles and legs testaceous; hind inner spur with five long teeth: wings dusky, nervures and stigma dark brown; abdomen shiny, apical margins of segments narrowly testaceous; segment one impunctate, bases of others closely finely punctured, becoming impunctate apically, the depressed apical margins of segments transversely striatulate; bases of segments two and three with white lateral hair patches.

Length, 5 mm.

Fedor, Texas, March 24, 1902. Rev. G. Birkmann collector.

Easily distinguished from all the other black species by the testaceous legs.

This species is dedicated to the Rev. Mr. Birkmann, from whom it was received.

Halictus lineatulus, n. sp., ♀.—Head and thorax dark green or blue-green; face broad, above antennæ closely, deeply punctate, below antennæ, including clypeus, very sparsely and more coarsely so; clypeus anteriorly purple, supra-clypeal area coarsely lineolate; antennæ obscurely ferruginous beneath; cheeks very ample; mesothorax shiny, coarsely lineolate, lineolation very apparent, with scattered setigerous punctures; median groove well impressed, parapsidal grooves distinct; scutellum closely punctate, punctures irregular in size, with two smooth shiny spots on the disc; base of metathorax not enclosed, with strong, coarse, irregular longitudinal striæ reaching apex only laterally; medially not quite reaching apex, and the intervening space roughened; mesopleura coarsely roughened, metapleura finely so; truncation granulose, not surrounded by a salient rim; wings hyaline, nervures honey-colour, stigma at times more brownish: tegulæ shiny dark brown; legs brown, hind inner spur with

about four long teeth ; abdomen green, disc of first segment occasionally showing brownish ; apical margins of segments broadly testaceous; whole abdomen, except discs of 1 and 2, covered with close appressed brownish-white pubescence ; segment 1 practically impunctate, 2 with base rather closely, finely punctate ; lateral margins and venter with long brownish-white hairs ; venter brownish-testaceous.

Length, 6–7 mm.

Ten specimens, Ag. Coll., Mich., Oct. 4–11, 1893 (R. H. Wolcott).

Most closely related to *zephyrus*, Sm., but differs in its larger size, stronger, more numerous rugæ of metathorax, more coarse apparent lineolation of mesothorax, much sparser punctuation of mesothorax, lighter nervures, dark tibiæ (not testaceous at base and apex), abdomen more densely pubescent and covering more of surface (confined to lateral patches on 2 and 3 in *zephyrus*).

Halictus Pecosensis, n. sp., ♀.—Black, head and thorax clothed with rather abundant griseous pubescence ; facial quadrangle wider than long ; clypeus shiny, with large scattered punctures ; face sericeously roughened with scattered very shallow oblique punctures below antennæ, above antennæ becoming closely, finely punctate only in front of ocelli, but not reaching orbital margins ; antennæ entirely dark ; mesothorax sericeous, closely, rather coarsely punctate ; median and parapsidal grooves obscure; base of metathorax with close, coarse, irregular striæ, not enclosed ; truncation not entirely surrounded by a salient rim; legs black, hind inner spur with three or four oblique almost obsolete serrations ; tegulæ dark, with a light centre ; wings subhyaline, nervures and stigma testaceous ; abdomen shiny, finely and sparsely punctate, segment one more sparsely so ; bases of segments two and three with large lateral hair patches almost connected medially on three.

Length, 6½ mm.

Pecos, N. M., 7,200 feet, at flowers of *Holodiscus australis*, July 21. W. P. Cockerell collector.

This species comes near the *pectoralis* group, but differs from any of them in the much wider face ; it also differs from *pectoralis* by its punctate first segment, hair patches on segments two and three, striæ of metathorax much finer ; from *pectoraloides* by the obsolete parapsidal grooves, first segment punctate; from *pseudopectoralis* by the first segment punctate, closer punctures of mesothorax and the lighter nervures and stigma.

GUELPH BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The third regular meeting of the Guelph Branch was held in the Agricultural College on Wednesday evening, November 15th, 1905, with 20 members and 38 visitors in attendance.

Mr. E. J. Zavitz discussed the "Long-Horned Borers" (Cerambycidæ), pointing out some of the more salient characters of the family, describing habits, methods of collecting, etc. Specimens of the work of Cerambycid larvæ in solid living wood were shown. His remarks were also supplemented by exhibiting the 94 species represented in his cabinet, nearly all of which were taken at Ridgeway, in Welland County, Ontario.

Mr. Douglas Weir presented notes on various species of insect-galls, and showed slides made from his own photographs, illustrating about 20 species collected during the autumn in the vicinity of Guelph.

A brief review of Kellogg's "American Insects" was given by Mr. Sherman.

Mr. C. Cæsar discussed "Grasshoppers," with special reference to life-history and economy of the destructive species, natural enemies, remedial measures, etc.

Brief discussion followed each of these papers.

The fourth regular meeting was held in the Agricultural College on Wednesday evening, November 29th, 1905, with 21 members and 13 visitors in attendance.

Mr. B. Barlow discussed "Mosquitoes," giving his experiences in collecting, breeding and methods of eradication. Specimens of egg masses and larvæ were exhibited, and a lively discussion followed. Mr. T. D. Jarvis gave a few notes on the Pitcher-plant Mosquito. About the middle of November the larva of this mosquito was taken from the leaves of the Pitcher-plant in the Arkell swamp, a few miles from Guelph. The larvæ were living in the solid ice of the "pitcher," and when the ice melted they became quite active.

A brief review of the current literature was given by Prof. Sherman. Bulletins from Ohio, Washington, Maryland, and Central Experimental Farm, were discussed.

Mr. C. R. Klinck discussed granary insects. He made collections from granaries and mills around Guelph, and presented a large collection of granary pests in different stages of development. Some of the common species found were: Rice weevil, Granary weevil, Saw-toothed granary weevil, Bean weevil, Pea weevil, Cow-pea weevil, Meal worms, Angoumois grain moth, Indian meal moth, Indian snout moth and flour mite.

T. D. Jarvis, Secretary.

HALTICA RUFA, ILL., AT MOUNT ST. HILAIRE, QUE.

I was out collecting at Mount St. Hilaire, Que., on the 27th June, 1905. After a long and tiresome walk through the woods, I came to a small marshy piece of land in which several small willows were growing. I immediately went to these bushes, expecting to get some Chrysomelidæ, in which I was particularly interested. I shook several of the trees over my net, and then examined what had fallen into it. My efforts were greatly rewarded by the finding of one specimen of a reddish Chrysomelid, which I at once placed in the Halticini group. I had never seen it in any of my outings, and thought it was a good species. I brought my capture to Mr. Stevenson's attention, who was with me that day, and he made a good search for another specimen. I do not know whether he got some or not, but for my part I managed to get another specimen after hard labour.

When I returned home I mounted them on card points, with exact data, and placed them in a special box, for future study.

It was only a month later that I succeeded in determining them. I first consulted Mr. Wickham's descriptions of the Chrysomelidæ of Ontario and Quebec, in the CANADIAN ENTOMOLOGIST, Vol. XXIX. A rapid glance showed me that my insect was not described here, so I looked up Dr. Horn's Synopsis of the Halticini of North America, published 1889. It did not take me long to find that the name of my little beast was *Haltica rufa*, Ill., an odd-looking *Haltica* indeed, and Dr. Horn is certainly right in stating the following remarks in reference to it: "This insect seems to have some trouble in finding a permanent generic resting place. Following the 'Catalogus,' it is a *Disonycha*, while a species completely congeneric (and I think also specifically identical) has been described in the 'Biologia' as *Lactica scutellaris*. That it cannot be referred to *Lactica* is evident from the character of the basal impression of the thorax, and the choice is plainly between *Disonycha* and *Haltica*. The latter genus has been chosen because there is a well-marked ante-basal depression of the thorax, which is, however, said to occur in *Disonycha*, but is not present in any of our species."

Dr. Horn gives to this insect a wide range of distribution, being from Massachusetts to Illinois, Florida and Texas, extending through Mexico to South America. I do not think it was ever known to be found in Canada, and I thought, therefore, it would be of general interest to record its capture here.

G. CHAGNON, Montreal.

CATALOGUE OF THE GENERA OF THE HEMIPTEROUS FAMILY APHIDÆ, WITH THEIR TYPICAL SPECIES, TOGETHER WITH A LIST OF THE SPECIES DESCRIBED AS NEW FROM 1885 TO 1905.

BY G. W. KIRKALDY, HONOLULU.

(Continued from Vol. xxxvii, page 420.)

57. Tychea, Koch, 1857, Pflanzenläuse, 296, t. *graminis*, Koch.*

58. Smynthurodes, Westwood, 1849, Gardener's Chron., 420, t. *betæ*, Westw.

59. Forda, Heyden, 1837, Mus. Senckenberg. II, 291, t. *formicaria*, Heyd.
= Rhizoterus, Hartig, 1841, Zeitschr. Ent., III, 363, t. *vacca*, Hartig, =*formicaria*, Heyd.

60. Pentaphis, Horváth, 1896, Wien. Ent. Zeit., XV, 2, t. *marginata* (Koch)* (o).

61. Hamamelistes, Shimer, 1867, Tr. Amer. Ent. Soc., I, 283, t. *spinosus*, Shimer*.
= Tetraphis, Horváth, 1896, Wien. Ent. Zeit., XV, 6, t. *betulina*, Horv.

62. Hamadryaphis, Kirkaldy, 1904, Entom., XXXVII, 279.
= ||†Kessleria, Lichtenstein, 1885, Mon. peupl., 16, t. *spirothecæ* (Pass.)*.

63. Dryopeia, Kirkaldy, 1904, Entom., XXXVII, 279.
= ||Endeis, Koch, 1857, Pflanzenläuse, 312, t. *bella*, Koch*.
= Eudeis, Ashmead, 1889, Ent. Amer., V, 189.

64. ||Amycla, Koch, 1857, Pflanzenläuse, 301, t. *fuscifrons*, Koch* [apparently not a valid genus].

Subfamily 5.—*Philloxerinæ*.

65. Adelges, †Vallot, 1836, C. R. Ac. Dijon, 224, t. *laricis*.
= †Sacciphantes, Ruricola [= Curtis], 1844, Gardener's Chron., IV, 831, t. *abietis* (L.), Curtis.
= Agelges (!) Schaum, 1854, Bericht Ent. for 1852, 143.
= Anisophleba, Koch, 1857, Pflanzenläuse, 320, t. *hamadryas*.
= ||Chermes, Passerini, 1860, Gli Afidi, 30, t. *abietis*, (L.), Pass.
= †Phlœophthiridium, Van der Hœven, 1849, Handb. Dierkunde, I, 509, type?
= Pineus, Shimer, 1869, Tr. Amer. Ent. Soc., II, 383, t. *pinicorticis*, Shimer.

(o) Kholodkovsky regards 59, 60 and 57 as synonyms.

=†Chermaphis, Maskell, 1884, N. Zealand, J. Sci., II, 292, t. *pini*.
=Kermaphis, Maskell, 1885, Tr. N. Zealand Inst, XVII, 16, t. *pini*.

66. Astegopteryx, Karsch, 1890, Ber. deutsch. Botan. Ges., VIII, 51, t. *styracophila*, Karsch.

67. Philloxera (and Phylloxera), Boyer, 1834, Ann. France, III, 222, t. *quercus*.
=Acanthochermes, Kollar, 1848, S. B. Akad. Wiss., Wien., I, heft 3, p. 18, t. *quercus*, Kollar.
=†Peritymbia, Westwood, 1863, Gard. Chron., 584, t. *vitisana* (= vastatrix).
=†Daktulosphaira, Shimer, 1866, Prairie Farmer, XXXIV, 365, t. *vitifoliæ*, Shimer.
=†Viteus, Shimer, 1867, Tr. Ac. Nat. Sci., Philad., XIX, 2, t. *vitifoliæ*, Shimer.
=Dactylosphæra, Shimer, 1867, op. c., t. *globosum*.
=†Psylloptera, Ferrari, 1872, Ann. Mus. Genova, II, 85, t. *quercina*.
=†Rhizaphis, Planchon and Lichtenstein, 1877, Ann. Belg., XIX,? t.?
=Rhizocera, T. W. Kirk, 1897, New Zealand, Dept. Agr., Leaflets for Gardeners, 20, p. 3.

DOUBTFUL POSITION.

68. †Termitaphis, Wasmann, 1902, Tijdschr. Ent., XLV, 105, t. *circumvallata*, Wasm.

69. †Polyocellaria, Imhof, 1900, Biol. Centralblatt, XX, 527 [no species named, according to Zool. Record] (a).

70. Oregma, Buckton, 1893, Ind. Mus. Notes, III, No. 2: 87, t. *bambusæ*, Buckton.

71. Atheroides, Haliday, 1839, Ann. Nat. Hist., II, 189, t. *serrulatus*, Hal.*

72. †Pentalonia, Coquerel, 1860, Ann. France (3), VII, 239, t. *nigronervosa*, Coq.

73. †Leptopteryx, Zetterstedt (?1838), Ins. Lapp., 625, t. *nivalis*, Zett. (p).

GENERA NOT DESCRIBED.

Toxares, T. A. Williams, 1891, Spec. Bull. Univ. Nebraska, 26.

Doralis and Pharalis [not *Phalaris*], Leach and Risso, in Risso, 1826, Hist. Nat. Eur. Mérid, V, 217.

(a) Described as allied to *Orthezia*, but placed in Zool. Record among Aphidæ.

(p) Sec. Bergtsson (1902, Wien. E. Zeit., 150), = probably †*Aphis punctipennis*, Zett., a species not recorded by Lichtenstein.

(B). "New species and varieties," 1885–1905.

Gen. 1.—*Macrosiphum.*

Sp. 1. agrimoniella (Nectarophora), Cockerell, 1903, Canad. Ent., XXXV, 168.

2. artemisiæ (N.), Cowen, 1895, Colorado, 123.
3. artocarpi (Siphonophora), Westwood, 1890, T. E. S., London, 649.
4. asclepiadis (N.), Cowen, 1895, Colorado, 123.
5. avenivorum, Kirkaldy, 1905, Entom., XXXVIII, 132 (n. n. for *granaria*, Buckton, nec Kirby).
6. baccharidis (N.), Clarke, 1903, Canad. Ent., XXXV, 252.
7. californica (N.) Clarke, l. c.
8. caudata,† Pergande, 1900, T. Ac., Washington, II, 513.
9. chrysanthemi (S.), Oestlund, 1886, Report 22.
10. corallorhizæ (N.), Cockerell, 1903, Canad. Ent., XXXV, 167.
11. corydalis (S.), Oestlund, 1886, Report 25.
12. cynosbati (N.), Oestlund, 1887, Bull. 81.
13. destructor (N.), Johnson, 1900, Canad. Ent., XXXII, 56.
14. epilobii,† Pergande, 1900, T. Ac., Washington, II, 515.
15. frigidæ (S.), Oestlund, 1886, Report 20.
16. fulvæ (N.), Oestlund, 1887, Bull. 80.
17. funesta (S.), Macchiati, 1885, Bull. Ital., 67.
18. geranii (N.), Oestlund, 1887, Bull. 80.
19. heleniella (N.), Cockerell, 1903, Canad. Ent., XXXV, 169.
20. jasmini (N.), Clarke, 1903, op. c., 252.
21. insularis,‡ Pergande, 1900, T. Ac., Washington, II, 515.
22. ludovicianæ (S.), Oestlund, 1886, Report 23.
23. lycopersici (N.), Clarke, 1903, Canad. Ent., XXXV, 252.
24. Martini (N.), Cockerell, 1903, op. c., 169.
25. pallida (N.), Oestlund, 1887, Bull. 84.
26. pœæ (S.), Macchiati, 1885, Bull. Ital., 62.
27. potentillæ (N.), Oestlund, 1887, Bull. 83.
28. purpurascens (N.), Oestlund, 1887, op. c., 81.
29. rhamni (N,), Clarke, 1903, Canad. Ent., XXXV, 252.
30. rudbeckiarum (N.), Cockerell, 1903, op. c., 168.
31. tabaci (N.), Pergande, 1898, op. c., XXX, 300.
32. trifolii, Pergande, 1904, Bull U. S. Ent., 44 : 21.
33. valerianiæ (N.), Clarke, 1903, Canad. Ent., XXXV, 252.

Gen. 4.—*Nectarosiphum.*

34. rhinanthi, Schouteden, 1903, Zool. Anz., XXVI, 687.
35. rubicola (Macrosiphum), Oestlund, 1886, Report 27.

Gen. 6.—*Rhopalosiphum.*

36. Grabhami, Cockerell, 1903, Canad. Ent., XXXV, 342.
37. nabali, Oestlund, 1886, Report 34.
38. serotinæ, Oestlund, 1887, Bull. 76.
39. sonchi, Oestlund, 1886, Report 34 (=dianthi (Schrank)).
40. violæ, Pergande, 1900, Canad. Ent., XXII, 29.

Gen. 10.—*Myzus.*

41. ajugæ, Schouteden, 1903, Ann. Belg., XLVII, 194.
42. eloreagni, Guercio, 1894,† Nat. Sicil., XIII, 197.
43. junackianus, Karsch, 1887,† Berlin Ent. Zeit., XXXI, Sitzb., p. xxi.
44. malvæ, Oestlund, 1886, Report 30 (=achyrantes (Monell)).
45. phenax, Cockerell, 1903, T. Amer. E. S., XXIX, 115.
46. potentillæ, Oestlund, 1886, Report 30 (= rosarum (Walker)).
47. targionii,† Guercio, 1894, Nat. Sicil., XIII, 197.
48. theæcola, Buckton, 1891, Ind. Mus. Notes, II, 33 (Ceylonia).

Gen. 11.—*Hyalopterus.*

49. phragmitidicola (Aphis), Oestlund, 1886, Report 44 (=arundinis, Fabr.)

Gen. 13.—*Aphis.*

50. adianti (Siphonophora), Oestlund, 1886, Report 26.
51. adusta, Zehntner, 1897, Archief voor Java Suikerindustrie, V (No. 10), p. ?
52. ageratoidis, Oestlund, 1886, Report 38.
53. alamedensis, Clarke, 1903, Canad. Ent., XXXV, 249.
54. albipes, Oestlund, 1887, Bull. 52.
55. annuæ, Oestlund, 1886, Report 43.
56. atronitens, Cockerell, 1903, Tr. Amer. Ent. Soc., XXIX, 115.
57. Bakeri, Cowen, 1895, Colorado, 118.
58. brunnea, †Macchiati, 1885, Bull. Ital., 61.
59. brunellæ, Schouteden, 1903, Ann. Belg., XLVII, 194.
60. ceanothi, Clarke, 1903, Canad. Ent, XXXV, 250.
61. cephalicola, Cowen, 1895, Colorado, 118.
62. chenopodii, Cowen, op. c., 119.
63. crithmi, Buckton, 1886, T. Ent. S., London, 323.

64. cymbalariæ, Schouteden, 1900, Ann. Belg., XLIV, 123.
65. eriogoni, Cowen, 1895, Colorado, 119.
66. eupatorii, Oestlund, 1886, Report 39.
67. Forbesi, Weed, 1889, Bull. Ohio Agr. Sta., II, No. 6 :148.
68. frigidæ, Oestlund, 1886, Report 46.
69. frondosæ, Oestlund, op. c., 38.
70. Gillettei, Cowen, 1895, Colorado, 120.
71. heliotropii, †Macchiati, 1885, Bull. Ital., 59.
72. heraclii, Cowen, 1895, Colorado, 120.
73. leontopodii, Schouteden, 1903, Ann. Belg., XLVII, 195.
74. maculatæ, Oestlund, 1887, Bull. 61.
75. maidiradicis, Forbes, 1891, Rep. State Ent., Illinois, XVII. 64.
76. marutæ, Oestlund, 1886, Report 40.
77. menthæradicis, Cowen, 1895, Colorado, 121.
78. mimuli, Oestlund, 1887, Bull. 57.
79. monardæ, Oestlund, op. c., 58.
80. mori, Clarke, 1893, Canad. Ent., XXXV, 250.
81. neilliæ, Oestlund, 1887, Bull. 59.
82. ochrocentri, Cockerell, 1903, Ent. News, XIV, 248.
83. œnotheræ, Oestlund, 1887, Bull. 62.
84. oxybaphi, Oestland, 1887, Bull. 62.
85. persicæniger, E. F. Smith, 1890, Ent. Amer., VI, 101.
86. polygoni, †Macchiati, 1885, Bull. Ital., 63.
87. ripariæ, Oestlund, 1886, Report 41.
88. robiniæ, †Macchiati, 1885, Bull. Ital., 65.
89. rociadæ, Cockerell, 1903, Tr. Amer. Ent. Soc., XXIX, 115.
90. rubicola, Oestlund, 1887, Bull 60.
91. sacchari, Zehntner, 1897, Archief Java Suikerindustrie, V, No. 10, p. ?
92. spirææ, Oestlund, 1887, Bull. 68.
93. ‖spirææ (q), Schouteden, 1902, Zool. Anz., XXV, 656.
94. suberis, †Tavares, 1903, An. Soc. Nat. Porto, VII, 83.
95. tetrapteralis, †Cockerell, 1902, Bull. S. Calif. Ac. Sci., 140. (I have only seen an unpaged separate.)
96. tamaricis, Lichtenstein, 1885, Bull. France (6), V, p. CLXXIX.
97. thaspii, Oestlund, 1887, Bull. 58.
98. trifolii, Oestlund, op. c., 55.

(q) =Schoutedeni, n. n.

99. valerianæ, Cowen, 1895, Colorado, 121.
100. veratri, Cowen, op. c., 122.
101. violæ, Schouteden, 1900, Ann. Belg., LXIV, 127.
102. yuccæ, Cowen, 1895, Colorado, 122.

Gen. 14.—*Hyadaphis.*

103. archangelicæ (Siphocoryne), Oestlund, 1886, Report 36.

Gen. 16.—*Aristaphis.*

104. beulahensis (Cladobius), Cockerell, 1904, Canad. Ent., XXXVI, 263.

Gen. 17.—*Melanoxantherium.*

105. bicolor (Melanoxanthus), Oestlund, 1887, Bull. 36.
106. flocculosus (Melanoxanthus), Weed, 1891, Insect Life, III, 291.

Gen. 18.—*Brachycolus.*

107. Korotnewi, Mordvilko —?—.

Gen. 19.—*Cryptosiphum.*

108. nerii, †Perez, 1902, Nuov. Giorn. Bot. Ital., N. S., VIII, 441.

Gen. 20.—*Pergandeida.*

109. ononidis, Schouteden, 1903, Zool. Anz, XXVI, 686.

Gen. 21.—*Microsiphum.*

110. ptarmicæ, Kholodovsky, 1902, Isviestiya S. Peterb. Liesn. Inst., 53 (Sep. 5 !).

Gen. 22.—*Chaitophorus.*

111. lyropictus, †Kessler, 1887, Nov. Act. Leop. Carol. Nat. Cur., LI :171.
112. maculatus, Buckton, 1899, Ind. Mus. Notes, IV, 277.
113. nigrae, Oestlund, 1886, Report 49.
114. spinosus, Oestlund, l. c.

Gen. 24.—*Sipha.*

115. Schoutedeni, Guercio, 1900, Ann. Belg., XLIV, 134.

Gen. 26.—*Kallistaphis.*

116. arundicolens (Callipterus), Clarke, 1903, Canad. Ent., XXXV, 249.
117. giganteus (Callipterus), Kholodovsky, 1899, Zool. Anz., XXII, 474.

Gen. 32.—*Stomaphis.*

118. Graffii, Kholodovsky, †1894; Bull. Soc. Nat., Moscow, 401 [Sep. p. 2 !].
119. macrorhyncha, Kholodkovsky, op. c., 402 [Sep. 3 !].

Gen. 33.—*Lachnus.*

120. abieticola, Kholodkovsky, 1899, Zool. Anz., XXII, 470.
121. bogdanowi, Mordvilko, 1895, op. c., XVIII, 97.
122. cembræ, Kholodkovsky, 1892, op. c., XV, 74 (as var. of pini).
123. curtipilosa, Mordvilko, 1895, op. c., XVIII, 100 (as var. of pineus).
124. farinosus, Kholodkvosky, 1891, Vistn. Yestyestv., No. 8, p. 5 [Sep.].
125. flavus, Mordvilko, 1895, Zool. Anz., XVIII, 102.
126. fuliginosus, Buckton, 1891, Ind. Mus. Notes, II, 41.
127. juniperinus, Mordvilko, 1895, Zool. Anz., XVIII, 102.
128. maculosus, Kholodkovsky, 1899, op. c., XXII, 469.
129. persicæ, Kholodkovsky, op. c., 472.
130. piceicola, Kholodovsky, 1896, op. c., XIX, 148.
131. pichtæ Mordvilko, 1895, op. c., XVIII, 103.
132. pineus, Mordvilko, op. c., 100 (var. of hyperophila, Koch).
133. pinihabitans, Mordvilko, op. c., 98.
134. pyri, Buckton, 1899, Ind. Mus. Notes, IV, 275.
135. rosæ, Kholodvosky, 1899, Zool. Anz., XXII, 471.
136. viridescens, Kholodovsky, 1896, op. c., XIX, 509.

Gen. 36 and 37.—*Eriosoma* and *Schizoneura* (r).

137. cratægi, Oestlund, 1887, Bull. 27.
138. glossulariæ, †Taschenberg, 1887, Verh. blatt. deutsch. Pomol. Ver., 86.
139. graminis, †Guercis, 1895, Nat. Sicil., XV, 84.
140. Karschii, Lichtenstein, 1886, Entom. Nachr., 82.
141. obliqua, Kholodovsky, 1896, Zool. Anz., XIX; 259.

Gen. 42.—*Colopha.*

142. rossica, Kholodkovsky, 1897, Zool. Anz., XX, 146.

Gen. 45.—*Geoica.*

143. cyperi, Schouteden, 1902, Zool. Anz., XXV, 656.
144. squamosa, Hart, 1894, Rep. Ins. Illinois, XVIII, 95.

Gen. 46.—*Hormaphis.*

145. papyraceæ, Oestlund, 1887, Bull. 19.

Gen. 47.—*Byrsocrypta.*

146. alni (Pemphigus), Provancher, 1890, †Faune Canad. Hém., 320.

(r) The following 5 were all described as Schizoneura, some may be Eriosoma.

147. attenuatus (P.), Osborn and Sirrine, 1893, Ins. Life, V, 235 [also described as "new" in 1895, P. Iowa Ac.].
148. betæ (P.), Doane, 1900, Ent. News. XI, 391.
149. coccus (P.), Buckton, 1889, †Tr. Linn. Soc., London (2), V, 142.
150. corrugatans (P.). Sirrine, 1894, P. Iowa Ac., I, 129.
151. edificator (P.), Buckton, 1893, Ind. Mus. Notes, III, No. 1 : 72.
152. hederæ (P.), Horváth, 1894, Rev. Entom. Franc, XIII, 188.
153. immunis (P.), Buckton, 1896, Ind. Mus. Notes, IV, 51.
154. lucifuga (Tetraneura), Zehntner, 1897, Archief voor Java Suikerind, V, No. 10, p. ?.
155. napæus (P.), Buckton, op. c., 50.
156. populi-conduplifolius (P.), Cowen, 1895, Colorado, 115.
157. protospiræ, Lichtenstein, 1885, †Mon. peupl., 31.
158. Riccobonii, Stefani, 1899, †Riv. Ital. Sci. Nat., XIX, p. 1.
159. saccarata, Guercio, 1895, †Nat. Sicil., XIV, 88 (as var. of fuscifrons).
160. spiriformis, Lichtenstein, 1885, †Mon. peupl., 25.

Gen. 51.—*Rhizobius.*

[160a. jujubæ, Buckton, 1899, Ind. Mus. Notes, IV, 277 (s).]

Gen. 52.—*Rhizoctonus.*

161. ampelinus, Mokrzhetsky, 1896, Trudy Russk. Entom., XXX, 438.

Gen. 54.—*Vacuna.*

162. betulina (Thelaxes), Buckton, 1886, T. E. S., London, 326.

Gen. 56.—*Cerataphis.*

163. lanigera (Ceratovacuna), Zehntner, 1897, Archief Java Suikerindustrie, V, No. 10, p. ?.

Gen. 57.—*Tychea.*

164. brevicornis, Hart, 1894, Rep. Ins. Illinois, XVIII, 97.
165. crassa, W. P. Cockerell, 1903, Psyche, X, 218.
166. groenlandica, †Rübsaamen, 1898, Bibl. Zool., XX, 115.
167. lasii, W. P. Cockerell, 1903, Psyche, X, 217.
168. pallidula, W. P. Cockerell, l. c.
169. radicola, Oestlund, 1886, Report 56.

Gen. 59.—*Forda.*

170. interjecti, W. P. Cockerell, 1903, Psyche, X, 217.
171. Kingii, W. P. Cockerell, op. c., 216.

(s) Previously described in 1883 by same author in Mon. Brit. Aph., IV., 181 ; is a Coccid Sec., Cockerell & Fernald.

172. occidentalis, Hart, 1894, Rep. Ins. Illinois, XVIII, 95.

Gen. 61.—*Hammamelistes.*

173. betulina (Tetraphis), Horváth, 1896, Wien. Ent. Zeit., XV :6.

Gen. 63.—*Adelges.*

174. bouvieri (Chermes), Kholodkovsky, 1903, Zool. Anz., XXVI, 259 (as var. of piceæ).

175. lapponicus (C.), Kholodkovsky, 1889, op. c, XII, 390.

176. pineoides (C.), Kholodkovsky, 1903, op. c., XXVI, 263 (as var. of piceæ).

177. præcox (C.) Kholodkovsky, 1896, Trudy Russk. Entom., XXXI, p. ? [Sep. 52 !].

178. sibiricus (C.), Kholodkovsky, 1889, Zool. Anz., XII. 388.

179. taxi (C.), Buckton, 1886, T. E. S., London, 327.

180. viridanus (C.), Kholodkovsky, 1896, Zool. Anz., XIX, 39.

Gen. 66.—*Astegopteryx.*

181. styracophila, Karsch, 1891, Ber. deutsche Botan. Ges., VIII., 52.

Gen. 67.—*Philloxera.*

182. piri, Kholodovsky, 1903, Zool. Anz., XXVII, 118.

183. prolifera, Oestlund, 1887, Bull. 16.

Gen. 68.—*Termitaphis,*

184. circumvallata, Wasmann, 1902, Tijdschr. Ent., XLV, 105.

Gen. 71.—*Oregma.*

185. bambusæ, Buckton, 1893, Ind. Mus. Notes, III, No. 2 : 87.

Accidentally omitted in foregoing list :

Gen. 3.—*Phorodon.*

186. calaminthæ, †Macchiati, 1885, Bull., Ital., 54.

Gen. 6.—*Rhopalosiphum.*

187. acænæ, Schouteden, 1904, Hamburg. Magalh. Sammelr. Aphiden, p. 4 (t).

Gen. 9.—*Mastopoda.*

188. pteridis, Oestlund, 1887, Report 53.

Gen. 10.—*Myzus.*

189. Michaelseni, Schouteden, 1904, Hamb. Mag. Samm. Aph., 3.

(t) Doubtless a separate from some periodical, but no information is given in the paper.

Gen. 13.—*Aphis.*

190. polanisiæ, Oestlund, 1886, Report 42.

P. S.—Since the above was in print, my friend, Dr. Horváth, has been so good as to reply to a letter of mine and furnish me with the following references :

Clavigerus, Szépligeti, 1883. Rovarászati Lapok, I, p. 4; type *salicis*, Kalt.

Bradyaphis, Mordvilko, 1894–5. Faun. Anat. Aphid., p. 46; type *antennata*, Kalt.

Symydobius, Mordv., op. c., 54; type *oblongus*, Heyd.

Neither of these papers is mentioned in the "Zoological Record" or in the "Bericht der Entomologie," the one being in Russian and the other in Magyar. The now defunct "Rovarászati Lapok" existed for a single year only (1883) and should not be confused with the current "Rovartani Lapok." The title of the Russian work is given me by Dr. Horváth as "K. Faunÿe i Anatomii sem. Aphididæ Privisliavskago Kraja. Varshava, 1894–5."

TWO NEW ONCIDERES, WITH NOTES ON SOME OTHER COLEOPTERA.

BY CHAS. SCHAEFFER, MUSEUM OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES, BROOKLYN, N. Y.

A fine large Oncideres, which agrees very well with the description of Thomson's *tessela'us*, was sent me lately for identification by Prof. Snow, who collected this fine addition to our fauna in S. Arizona this year. The occurrence of this species in our fauna gives me the opportunity to make known another large Oncideres from Texas, apparently new, which belongs with *tesselatus* to the sub-genus *Lochmæocles*. Following, I give also a new synoptic table, as I never derived great satisfaction from the one given by Dr. Hamilton,* who suppresses *putator*, but allows *Texana* to remain. My material is not very extensive, but to me *putator* seems to be more distinct than *Texana*, though an extensive series from intermediate localities may show that they are only extreme forms of *cingulata*.

Thorax as wide behind the lateral tubercle as before, ♂ with antennal tubercles prolonged at apex into distinct porrect horns. (Subgenus *Lochmæocles*.) ..... 1.

*Trans. Am. Ent. Soc., XXIII, p. 140.

Thorax narrower behind the lateral tubercle than before, ♂ without porrect horns. (Sub-genus *Oncideres.*) ..... 2.

1. Light brown, not very densely clothed with uniform brownish cinereous hairs ; elytra ornamented with a number of small rounded ochreous spots, base with from 4 to 6 small blackish granulations, the elytral punctures covered by the pubescence ..... *cornuticeps.*

Black or piceous, more densely covered with white pubescence, especially the under side; elytra with a number of reddish yellow spots, at sides about middle, a more or less distinct oblique fascia of denser white hairs, the fascia without reddish-yellow spots, basal third of elytra with a number of black shining granules, the punctures below these glabrous, shining, not covered by pubescence ..... *tesselatus.*

2. Large robust species, elytra with a number of round, slightly elevated, shining black spots, which are at base granuliform ..... *pustulatus.*

Smaller species, elytra without black denuded spots, but with a number of small, rounded, cinereous or yellowish spots, formed by denser pubescence ..... 3.

3. The small pubescent spots at middle of elytra white, head, base of elytra and legs densely covered with ochreous pubescence ; form narrower and more elongate than *cingulata* ..... *quercus.*

The small pubescent spots at middle of elytra yellow or ochreous, pubescence of head not dense, yellowish or luteous, legs not very densely pubescent with cinereous hairs and, if at all, very sparsely intermixed with yellow hairs ..... 4.

4. Disk of thorax with 3 denuded shining spots, placed transversely, lateral spine small, though distinct ; elytra coarsely, densely punctate, with a number of granules at base, colour black or blackish-brown ..... *putator.*

Disk of thorax without 3 denuded spots, sometimes with a small glabrous median line ; elytral punctuation more sparse, without or with at most very few granules at base ..... 5.

5. Tubercles at sides of thorax distinct, colour dark brown, median fascia of elytra white (in fresh specimens) ..... *Texana.*

Tubercles at sides of thorax absent or very feeble, colour reddish-brown or luteous, median fascia cinereous ..... *cingulata.*

Oncideres cornuticeps, n. sp.—Short, robust, nearly of the same form as *pustulatus*; colour very light brown, pubescence fine, not coarse, permitting the shining surface of elytra to be seen, brownish-cinereous intermixed with denser ochreous pubescence above, forming numerous small spots on elytra and two on disk of thorax; the latter are situated on each side of the median glabrous space. Antennal tubercles prolonged at apex into distinct porrect spines. Thorax broader than long, as broad behind as before the distinct lateral spine; disk slightly uneven, with a few punctures at base and on side tubercles, at middle a small glabrous space, which is obsolete towards apex. Elytra slightly narrowing to apex from the shining humeral tubercle, which is situated at side, a little below the base; punctuation sparse and nearly uniform throughout, the punctures only slightly smaller towards apex, and are not glabrous, but covered by the pubescence, at base are about 4 or 6 small shining granules on each elytron. Abdomen shining, more densely clothed with longer hairs than the upper surface, each segment with two denuded round spots on each side. Length, including the frontal horns, 20 mm. One male labelled Texas in collection Dietz.

Lypsimena tigrina, Skinner, Ent. News, XVI, p. 291.—The description of this beetle is unsatisfactorily short and insufficient, and does not give any idea of the general form and other important characters, especially troublesome if the species is placed in a wrong genus, which I believe is the case here.

In Lepidoptera, where the species differ very little in shape, etc., colour and markings are considered important in separating species, but in Coleoptera, where, with very few exceptions, the species in a genus differ from each other either in general form, form of thorax and elytra, structure or sculpture of the under side, head, antennæ, legs, or some other character, colour and markings are considered secondary.

I cannot find among my Arizona material a *Lypsimena*, but have taken a few specimens of an *Estola*, which I think is the same as the Doctor's *L. tigrina*. It is a longer and less robust insect that the Lower Californian *sordida*, but agrees with it in all generic characters, except that the lower lobe of the eyes is longer, which we find in some Mexican species also. The armed thorax removes it from *Lypsimena* at once, besides other characters.

The linear black dashes on the elytra are subject to variation, they have a tendency to become longitudinally confluent, and the four post-

median ones also transversely confluent, forming in some specimens a black fascia of irregular outline.

The size and markings of my insect agree with the Doctor's description, and I have no doubt that this is the species, but in case it should prove different I propose the name of *Estola picta* for it.

Byrsopolis lanigera, Bates.—Dr. Skinner, l.c., records the occurrence of this species. I have taken several specimens of this species, but the description of *Byrsopolis Chihuahuæ* fits our insect better. *B. lanigera* has the clypeus "sinuatim angustato, apice quadratim sublobato, reflexo, truncato," anterior angles of thorax "nullo modo productis," basal margin subinterrupted, all characters which my specimens do not possess, while *B. Chihuahuæ* has the clypeus "triangularis, lateribus leviter sinuatis, apice medio acuminato-reflexo," anterior angles of thorax "subacutis,' basal margin "omnino integro." Our insect has all these characters, and I had identified it as that species already.

Cymatodera tricolor, Skinner, l.c.—I have taken several specimens of this species, but in all my specimens the "head and outer third of the thorax" is not dark green, but black or blackish. The colour of the head and thorax is variable. I have one specimen which has the head and thorax reddish-testaceous, and another specimen has the head and the greater part of thorax black, with only the base narrowly reddish.

My specimens are mounted on cards yet, otherwise I would give here the abdominal, antennal and other characters, so important in this troublesome genus, which are passed in silence in the description.

Clerus bimaculatus, Skinner, l.c.—This species is variable in regard to colour. The abdomen is not brown as described, but red, very bright in fresh specimens, and the upper side and legs in some specimens black or piceous, with the apical part of thorax and base of elytra brownish. The under side is reddish, with the metasternum infuscate at middle in some specimens. The spots on the elytra are bright yellow when alive, but changing after death in most specimens to reddish, only in two or three of my specimens the spots remained yellow, but not as bright. The apex of the elytra is clothed with cinereous pubescence, as in *moestus*, but having on each side a spot formed by black hairs.

Polycesta Arizonica, n. sp.—Similar to *velasco*, but smaller, thorax not as broad, and only the alternate elytral intervals costate. Head slightly convex, nearly flat in the clypeal region, coarsely and densely punctate, a short costiform smooth median line. Thorax transverse,

arcuately narrowing to apex, broadest at about basal third, base before the scutellum impressed; surface coarsely punctate, the punctures well separated on the disk, but denser and confluent in the apical region at sides, on the median line from apex to base is a narrow, smooth space, with a fine impressed line at middle, which is very distinct at base, gradually finer and disappearing entirely near apex. Elytra as wide as the thorax at base, nearly parallel to slightly behind the middle, then arcuately narrowing to apex, which is obtusely rounded and coarsely serrate; elytral intervals alternately elevated into distinct costæ on the disk, more feebly at sides, the costæ sparsely punctate; the intercostal space slightly convex at middle, very coarsely punctate, the punctures more or less transversely confluent, in addition there are at middle a row of smaller punctures, representing the punctures of the costate intervals. First ventral suture straight, last ventral segment of male broadly arcuate at apex, at middle produced into a lobe-like projection, which is carinate on its ventral surface, last ventral segment of female narrowing to apex, which is slightly truncate. Length of male, 15 mm.; of female, 20 mm.

Palmerlee, Cochise Co., Arizona. Beaten from branches of live oak.

This species is near *velasco*, but is smaller, has a narrower thorax and different elytral sculpture. The last ventral segment of the females is variable, in some the apex is subacute and has a well-defined costa, in others it is more broadly rounded, and the costa is hardly visible. The same can be said of the male, though there is never as much variation as in the female.

In Entomol. News, Vol. XVI., p. 73, Mr. Fall restores *elata* to specific standing on an apparent good character. This species is separated from *Californica* in the table given by the last ventral segment produced into a lobe at middle (angulate in *Californica*), and from the remarks the female does not differ much in this respect from the male. I have seen quite a number of specimens of *elata*, consisting of both sexes, and find that the lobed last ventral is only peculiar to the male, and not alone in this species, but also in *velasco* and *Arizonica*. Unfortunately, I have only three specimens of *Californica*, all female, but have no doubt that the male of *Californica* has the last ventral segment formed as in *elata*. The so-called median carina of thorax is in one of my specimens of *Californica* as distinct as in *elata*, in another specimen faintly seen, and cannot be relied upon for the separation of the two. If, as I suspect, the male of *Californica* has the same abdominal character as *elata*, there

remains only the difference in sculpture and the more or less distinct concave front. The last abdominal segment of the females in all of our species is variable, hardly two specimens of the same species are exactly alike, some have the apex subacute, others obtusely truncate, the ventral surface may or may not be carinate.

P. angulosa, Duv., which was overlooked by Mr. Fall in his table, has a peculiar male character, consisting of a densely-punctured and densely-pubescent oval spot on the first abdominal segment at middle, and is the only species (except *Californica ?*) which has the last segment simple, without lobe-like prolongation at middle. The species can be further distinguished from the rest of our species by the distinct rows of large rounded punctures on the elytra and the strongly-angulated thorax.

The description of *P. obtusa*, Lec.,* fits *angulosa* better than *velasco;* the finding of it in Philadelphia was undoubtedly accidental. Based on the characters mentioned above, the following synoptic table for our North American species of *Polycesta* is presented below:

First ventral suture at sides strongly arcuated.....1.
First ventral suture straight throughout.....3.

1. Thorax with broad median and smaller lateral impressions, sculpture of elytral intervals punctate, and more or less coarsely rugose, apex of last ventral of male produced at middle into a lobe-like projection, first ventral without pubescent spot.....2.
Thorax with broad median, but without lateral impressions, elytra with well-defined rows of relatively large punctures, apex of last ventral of male not produced at middle, but first ventral segment wirh a densely-punctured and densely-pubescent oval spot at middle.....*angulosa.*

2. Front flat near the clypeal region, the punctuation of elytral intervals more evident, not coarsely transversely confluent.....*Californica.*
Front concave near the clypeal region, sculpture of elytral intervals coarsely transversely confluent.....*elata*

3. Elytral striæ deeply impressed and somewhat coarsely punctate, all the intervals more or less distinctly costate, last ventral of male at apex prolonged at middle into a lobe-like projection.....*velasco.*
Elytral striæ not impressed, only the alternate intervals costate, the intercostal space coarsely and transversely confluently punctate; last ventral of male at apex produced at middle.....*Arizonica.*

*Proc. Acad. Nat. Sciences, Phil., 1858, p. 68.

A REVIEW OF DR. WALTHER HORN'S "SYSTEMATISCHER INDEX DER CICINDELIDEN."

BY H. F. WICKHAM, IOWA CITY, IOWA.

The above-named paper, which has lately appeared in the Deutsche Entomol. Zeitschrift (1905, II, pp. 1–56), is of the highest value to American students of the Coleoptera, though in these days of minute subdivision and endless creation of genera and species upon the lightest pretext, it may come as a surprise to those who have consulted only our American publications on the subject. It represents the views of an investigator who has all the advantages of wide acquaintance with types of the described species and with the literature of the subject. Only about 20 of the many forms listed were unknown to the author, whose recent visit to the United States is still a pleasant memory to those fortunate enough to meet him.

Dr. Horn has made a number of changes in the hitherto accepted nomenclature of the family, especially in the direction of reduction of the number of generic and specific names. He recognizes as genera and species only those series of forms which can be delimited by characters at once weighty and constant. For aggregations of less than specific value, he uses the following terms :

1. Subspecies. Sharply defined geographical races, characterizable by features of importance.

2. Aberrations. Local forms definable only by relatively slight characters (colour, pattern, size) and all striking sporadically occurring forms.

3. Synonyms. A collective term for everything unnecessary, true synonyms, feebly differentiated forms separable only by minor features of colour and pattern, intergradations, and local and geographical races so ill developed as to require a locality label for certain recognition.

The Cicindelidæ (in broad sense) are arranged thus :

A. Alacosternaliæ, W. Horn.

I. Ctenostomidæ, Lac. (Pogonostoma and Ctenostoma.)

II. Collyridæ, Chaud. (Collyris and Tricondyla.)

B. Platysternaliæ, W. Horn.

III. Theratidæ, W. Horn. (Therates.)

IV. Cicindelidæ, Lac.

1. Eurodini, W. Horn. Iresia, Langea, Euprosopus, Eucallia, Caledonica, Dystipsidera, Nickerlea, Caledonomorpha, Prothyma, Beckerium, Eurytarsa.

2. Odontochilini, W. Horn. Heptodonta, Opisthencentrus, Oxygonia, Odontochila, Prepusa.

3. Cicindelini, W. Horn. Pentacomia, Cicindela, Eurymorpha, Apteroessa.

4. Dromicini, W. Horn. Dromica.

V. Megacephalidæ, Lac. Pseudoxychila, Oxychila, Chiloxia, Megacephala (with Tetracha, Phæoxantha, etc., as synonyms or subgenera), Aniaria.

VI. Neomantichoridæ, W. Horn. Pycnochila, Omus, Amblychila.

VII. Palæomantichoridæ. W. Horn. Mantica, Mantichora.

VIII. Platychilidæ, W. Horn. Platychila.

It is impossible, within the limits of a review of this nature, to discuss the system of classification in detail. The student of the American forms will be interested in noticing that the arrangement of our species of Cicindela is totally different from that now obtaining in our lists. This is due chiefly to the emphasis laid upon the characters drawn from the vestiture. The nearctic fauna is treated as a whole, the Mexican forms materially increasing the number.

When we analyze the list closely, a considerable number of minor changes in nomenclature becomes evident. Many of the forms that we have been accustomed to regard as specifically distinct, are degraded to the rank of subspecies or aberrations. One must confess to a feeling that the difficulty hitherto experienced by calling all the fairly well differentiated forms species, is not entirely overcome by their arrangement as subspecies and aberrations. Here the same trouble occurs as of old—the subspecies offer varying degrees of perfection of differentiation, and the same is true of the aberrations. It still remains largely a matter of opinion whether a given subspecies may not be well enough marked and sufficiently constant in its characters to deserve specific rank, and several instances occur in which it is equally uncertain whether a form were best considered a subspecies or an aberration. However, the relations between closely allied forms are often well brought out by Dr. Horn's arrangement, as for example in the group classed as *pusilla*, Say, including as subspecies *imperfecta*, *cinctipennis* and *tunalonga*, *cyanella* and *tuolumnæ* ranking only as aberrations. No one with a full series of the different forms can for a moment believe that each is of specific rank, though extremes are sufficiently readily separable. Specimens from the Great Basin grade perfectly from *cinctipennis* to *imperfecta*, and some of those from Colorado

connect the former equally well with *pusilla*. A number of our North American forms now appear as subspecies of Mexican type. In other cases the names we have been using are simply displaced by older ones, *vulgaris* going by the name *tranquebarica*, Hbst., *modesta* becoming *obscura*, Say. So many changes of one kind and another are made that the American student should by all means see the work in its entirety. To the reviewer, it appears that Dr. Horn has worked with a much clearer appreciation of the subject than any of his predecessors, and, while one may not agree with him in every detail, it is impossible to overlook the fact that the student of the family as a whole is much better fitted for classificatory work than the entomologist who confines himself to a limited fauna.

The arrangement of the subfamilies and genera is based upon phylogenetic theses, which are of sufficient interest to sketch out here. Briefly stated, the line of descent is indicated thus—the deductions being made upon structural and geographical grounds alone, the geological record being silent.

The first forms of a Cicindelide nature arose in the Ethiopian tropics from a Carabidous stem. These apterous primitive Cicindelidæ were allied to the recent types of Platychilidæ and Palæomantichoridæ, and to them the name Protomantichoridæ is applied. The Protomantichoridæ spread westward to America, their descendants later pushing out to the north and south. These forerunners of the Neomantichoridæ led to the development of the Prototetrachidæ, which were then distributed circumzonally along the equator.

Complicated characters of vestiture appeared later. Next, in part through partial decoloration and partly by irregular disposition of the hairs, false patterns were formed on the elytra, whose equivalents are to be seen in the now dominant pigmental patterns.

A further step led to the development of the Protoeuryodidæ, which likewise inhabited the entire tropics. Among these was first developed a high power of flight. Now appeared the arboreal forms. Types of the nature of *Tricondyla* and *Therates* led at last to the Protopogonostomidæ.

The species of the genus *Cicindela* are geologically the youngest of the Cicindelide forms. They are to be considered descendants of the Protoeuryodidæ, and in them first appears the highest development and greatest potential variation of vestiture and pattern. With respect to the

indirect descendants, the author has indicated several principal stems (not primitive forms). In respect to the North-stem and the South-stem in the groups occurring in the Holarctic region, he lays down the following hypotheses :

The two North-stems developed, during a colder period, in what is now a warmer region of Africa. Later they separated, the smaller part going southward, seeking the cooler climate, the main body being meanwhile forced farther and farther to the north, returning later (split into North American and Eurasiatic branches) to the south. The home of the two so-called South-stems may be in the warmer part of America. Then follows a phenomenon analogous to the above, with the difference that here two equally great migrations took place, the forerunners of the *cuprascens* group going northwards, those of the *nivea-ritsemæ* group southwards. Both reached the Arctic or Antarctic land connections. The species of the *elegans-trisignata* group are then the posterity of the south-bound Arctic Eurasiatic branch, the *helmsi-dunedinensissætigera* group perhaps coming from the north-bound Antarctic Australasian branch. In spite, however, of these statements, neither the Arctic nor the Antarctic regions have produced indigenous Cicindelæ, their influence on the great influxes being only that of paths of a passing emigration. The true home of all the *Cicindela* stems is in the tropics or the subtropics.

NOTES ON TÆNIORHYNCHUS SQUAMIGER, COQ.

BY H. J. QUAYLE, AMES, IOWA.

Prof. Smith, of New Jersey, records *Tæniorhynchus (Culex) squamiger*, Coq., as being a strictly fresh-water form in that State, and it will be interesting to know that so far as my experience goes during the past season, it is exclusively a salt-marsh mosquito in the San Francisco Bay region of California. It may be possible that we have two different forms, but in a quantity of material which I have just examined they appear to agree in all essential particulars, both as regards larva and adult, with the descriptions given in Prof. Smith's report. There is one character, however, in the larva that is quite at variance, and that is the tracheal gills. In my specimens they are very short, in no case as long as the width of the 9th segment, while in Prof. Smith's report they are given as longer than the length of the segment, for the New Jersey *squamiger*. At any rate, if they are not the same mosquito, I believe my specimens are the

typical *squamiger*, since they have been so determined by Mr. D. W. Coquillett, and were taken a few miles up the bay from where the original *squamiger* was obtained, and which was described by Mr. Coquillett.

However, it is the habits I wish to speak about here. Larvæ of this species were found without exception in the salt water pools, and almost invariably with *Curriei*, which is a strictly salt-marsh mosquito in this territory. Larvæ first appeared on February 20th, and none were seen later than April 20th. Adults from this brood made their way to the hills opposite, and while they were not found to have the migratory habit so well developed as *Curriei*, which was observed to migrate ten miles, they were found at least three or four miles from their breeding ground. No adults were seen to emerge after March 25th, due to our control work, and none were found flying about on the marsh after the middle of May, although adults were found in the hills up to July 2nd. We may infer, therefore, that the maximum adult life may be three months, and this agrees with the New Jersey observations. It was found there, however, that the species is single brooded, but in 1904 a brood was observed to emerge on the San Francisco Bay marsh in September, making at least two in this section, but, of course, climatic conditions may explain this difference.

Negative evidence points to the fact that this species passes the winter in the egg stage, the eggs hatching as already mentioned, very early in the following season. Since the adults were seen in the hills nearly two months after their disappearance on the marsh, it is evident that at least the majority do not make their way back to the marsh for egg-laying. Of those that migrated, three or four were found with eggs early in the season, but the great majority had no eggs developed. Further evidence, however, is necessary to establish or disprove the fact that the migratory forms are barren. Besides *Culex Curriei*, this is the only marsh species found in this territory, and because of the fact that it is fewer brooded it is not so abundant.

Mr. A. F. Winn, Secretary of the Montreal Branch, has changed his address to: 32 Springfield Avenue, Westmount, P. Q.

Mailed January 6th, 1906.

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PRACTICAL AND POPULAR ENTOMOLOGY—No. 10.

The Dragon-flies and Damsel-flies (Order Odonata).

BY FRANKLIN SHERMAN, JR., AGRIC. COLLEGE, GUELPH, ONTARIO.*

In most parts of temperate North America the true Dragon-flies are among the most conspicuous members of the insect class in any community where water is at hand. Strong of flight, quick as a thought in their darting movements, wary in the highest degree, they are usually well-known to all by sight, yet not often captured by the amateur collector unless he takes the time to devote his special attention to them at some favourable place.

The Damsel-flies, on the other hand, are less wary and less active, and may often be caught in the hand or picked up in the fingers from their resting-place on grass-stems, etc. Their delicate wings and frail bodies are, however, easily broken, and they are not favourites with collectors, all the less so as they are quite difficult to classify even when in perfect condition.

Under the older system of classification, they were included in the order Neuroptera along with a number of other insects. By more recent workers they have been assigned an order to themselves—the Odonata. Some entomologists regard them as comprising but one family,—others as two families, but the tendency with the most modern workers who have devoted special attention to them is to group them into six and sometimes even seven families. It is therefore somewhat a matter of preference as to what system we shall adopt. For the purposes of this article we have divided them into six families, all of which are represented in Ontario, and all but one, quite commonly.

Classification into Families.

The characters used in classifying the Odonata into families are based wholly upon the wings and the eyes, and are characters which are easily recognized if one first learns a little of the structure of these insects.

*In this article as well as in any others which he may contribute under the head of "Popular or Practical Entomology," the writer lays no claim to originality in the matter presented, nor are references to literature commonly quoted. The object here is to present the subject in a manner easily understood by non-technical readers.

The Eyes are large and prominent, one on each side of the head. They may be widely separated, almost touching, barely touching at one point only, or meeting for some little distance. The size of the eyes and their prominent position on the head accounts in large degree for the wariness of these insects.

The Wings are long and narrow as compared with those of butterflies. In the active Dragon-flies the hind wings are quite broad at their base (next the body), while in the weaker Damsel-flies they are narrowed at the base.

In all Odonata there is a notch-like or joint-like structure on the front edge of the wings about mid-way its length ; the *nodus*.

The *pterostigma* (which is absent in some Odonata) is a distinct, hardened or conspicuously coloured small patch on the front edge of the wing between the nodus and the tip of the wing, usually nearer the latter. Examine a specimen carefully and you will plainly see the framework of the wing :—hardened black lines called *veins*, which support the thin *membrane* of the wing. Note that in the front part of the wing there are several strong veins running lengthwise. The very front margin of the wing itself is a strong vein, which extends all the way around the wing. The next of these lengthwise veins usually only extends to the nodus, and between it and the vein which forms the margin of the wing are a number of small veins running perpendicularly between the two :—this is the *first series of antenodal veins*, so called because they come (starting at the base of the wing) *before* the nodus. Between this second lengthwise vein which stops at the nodus and the *third* lengthwise vein which runs right on past the nodus to the pterostigma, is the *second series of antenodal veins*. Now, sometimes these two series of antenodal veins correspond : that is, one of the second series is continuous with one of the first series, as if it were one continuous antenodal vein running from the margin of the wing to the third lengthwise vein. In other cases these two series of antenodal veins do not at all correspond, and only rarely will you find a vein which is continuous from the margin to the third lengthwise vein.

Now, upon the characters which we have just discussed—(1) the position and relation of the eyes ; (2) the shape of the hind wings and (3) the correspondence (or lack of it) between the two series of antenodal veins—we may construct an easy table for separating our Odonata into their six families.

A. Eyes wide apart, projecting from the head,—the hind wings narrow at base, and the wings held vertically over the back when not in use. . . . . (Damsel-flies.)

B. Not more than 5 antenodal veins in either series.....Family *Agrionidæ*
BB. More than 5 antenodal veins in either series.....Family *Calopterygidæ.*
AA. Eyes *usually* not far apart,—hind wings broad at base, and the wings are held extended horizontally by the insect when not flying.....(True Dragon-flies.)
C. The two series of antenodal veins not corresponding.
D. Eyes widely separated.....Family *Gomphidæ*
DD. Eyes touching only....Family *Cordulegasteridæ.*
DDD. Eyes meeting for some distance..Family *Aeschnidæ.*
CC. The two series of antenodal veins corresponding.....Family *Libellulidæ.*

Of the above six families the Agrionidæ and the Libellulidæ contain by far the greater number of species ; the Cordulegasteridæ have only a few species, all of which are rather uncommon.

Fig. 1.

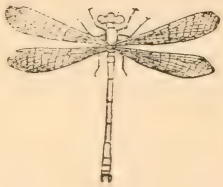

Fig. 2.

Fig. 1.—One of the Libellulidæ, or true Dragon-flies. Note that the hind wings are broad at base and the eyes meet on the head. In this figure the second series of antenodal veins is easily seen and they correspond with the first series. (See Key to Families).

Fig. 2.—One of the Agrionidæ or Damsel-flies. Note that the hind wings are narrowed at base and that the antenodal veins are not numerous or close together. The eyes are widely separated. (See Key to Families).

Fig. 3.—A young or nymph of one of the Dragon-flies. Note the buds of wings or wing-pads, and that the general shape of the body is quite similar to that of the adults.

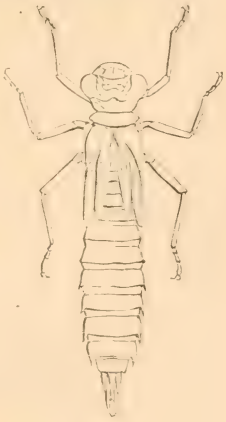

Fig. 3.

All of the Odonata deposit their eggs in water, and the young insects bear some resemblance to the adults in the shape of the head and size of the eyes, and in the avidity with which they prey upon other weaker insects. The young of the Damsel-flies are more slender than those of the true Dragon-flies and are further distinguished by having several flat leaf-like plates at the hind end of the abdomen, which aid in purifying the blood by acquiring fresh air from the very minute bubbles which are present in the water. In the young of the true Dragon-flies there are no such plates, but the air is drawn into and forced out of the hinder part of the body.

There is, among the ignorant, much needless fear of the Dragon-flies. In various sections they are known as Dragon-flies, Darning-needles, Snake-doctors, Mule-killers, Mosquito-hawks, etc. Of these names, the first and last give the truest idea of their habits. They are true dragons of the air, and undoubtedly do devour immense numbers of mosquitoes; for woe unto the gnat or small fly which is spied by a dragon-fly !—a swift swoop of the long, strong wings, a quick dart of the Dragon-fly, and the place which knew the gnat knows it no more. They are absolutely harmless to man and may be handled in the fingers with impunity : a slight pinching with their jaws is all that they can give,—but this, while nothing to us, means death to weaker creatures.

The appetite of an adult Dragon-fly is something remarkable. I have seen specimens held in the hand cease struggling to munch on a proffered fly, and the same thing may be observed even when the creature is impaled on a pin which is passed directly through the body between the wings. But most remarkable of all was the case in which a captured specimen, when its own body was bent under so that the tip was near its mouth, seized its own abdomen and ate off two of the segments !

The Odonata is a good example of a group of insects which for a long time were regarded as of no economic importance, but which suddenly acquired interest. When it had been clearly demonstrated that mosquitoes may transmit the germs of malaria and yellow fever to man, the question of natural enemies of mosquitoes became important. Mosquitoes lay their eggs in water and the young are known as "wrigglers" or "wiggle-tails." Coursing over the pool and marshes, the large, swift Dragon-flies surely destroy many an impregnated female mosquito, or more likely destroy them when they first emerge, before they are ready to lay eggs. In the pool, creeping about on the bottom in the shallow places, the young Dragon-fly doubtless makes many a happy meal on the luckless wrigglers which come within reach.

There should be between 100 and 130 species of Odonata found in Ontario. They have been but little studied here. Dr. E. M. Walker, of Toronto, has probably done more work upon this group than anyone else, and I am glad to know that he will likely soon publish in this journal a list of the species which he has observed. During the coming season, which will not be far distant when this article appears, let us hope that our Ontario collectors, at least, will give more attention to this interesting group.

WHAT EUCHŒCA COMPTARIA, WALK., REALLY IS.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

My last paper, upholding Dr. Hulst's determination that *E. perlineata*, Pack., is the above species, was intended also to convey the idea that until we knew *positively* that he was wrong it was better to accept his decision. Nor was it my desire to belittle the judgment of Mr. Prout, as I expressly stated. Immediately after its publication I received two letters from Mr. Prout, explaining his views so clearly that I began to doubt the correctness of my opinion, as set forth in my paper upon "The Genus Venusia and Its Included Species."[1] It must be noted that up to that time none of us had seen Dr. Packard's types. In the paper last named I mentioned that *comptaria*, Walk. (=*perlineata*, Pack.) was taken plentifully by me in the Catskill Mts., and I proceeded therefore to describe another eastern form under the name of *salienta*, associating with it a larger Californian species, which my scant material did not warrant me in separating. Later,[2] with the receipt of a larger series, I had about determined that it was entitled to specific rank, and that opinion I now hold. Convinced that Mr. Prout would be able to judge correctly, I forwarded to him examples of what I called *comptaria*, Walk. (=*perlineata*, Pack.), from the Catskill Mts., co-types of *salienta*, Pears., and of *Nomenia 12-lineata*, Pack., as separated by me. He had advised me that he already had a good series of the western form of *salienta*; hence he would have before him both of our eastern and both of our western species for comparison with Walker's type of *comptaria*.

On Nov. 22nd I went to Cambridge, where, by the courtesy of Dr. Henshaw, I was permitted to examine freely the Packard types. The result was clarifying, if not altogether gratifying, for I found that in *salienta* I had been guilty of adding another synonym to the many. It is the *perlineata* of Packard without a shadow of doubt. The species I

1 CAN. ENT., Vol. 37, p. 125.
2 CAN. ENT., Vol. 37, p. 331.

have been calling *comptaria* (=*perlineata*) is not in the Packard collection at all, and is the one I should have described.

In the Packard collection *perlineata* is represented by two males labelled "type" from "West Virginia, Mead. 4. 9. 72," in good condition, and referred to in description, page 83, Mono. Geom. Moths, 1876. *12-lineata*.—Under this name are four males, labelled "type," all from California. Three of them belong to the genus Nomenia, bearing unipectinate antennæ. The fourth is a male without a vestige of antennæ, but is certainly the western form of Euchœca, referred by me to *salienta*. It was the custom of Dr. Packard to describe from a group of specimens, calling all of them types, and he so labelled them. In the Monograph Geo. Moths, 1876, *perlineata* was represented by five males and five females; of these, only two males are left. Of *12-lineata* he had three males and five females. Now there are four males left. Three are the males of Nomenia. Where did the other ♂ come from? Did he consider the other western species with its simple antennæ to be females of the first? It would appear so. Again, in taking description from a group of specimens involving two species, he makes reference to a certain characteristic which may belong to one species or the other, and where it becomes necessary to separate them, as in the case of *12-lineata*, the description may not wholly fit either of them. After many careful comparisons between my specimens and his description and plates (note its simple antennæ), I find them to agree so well that, as offering the best way out of a complex situation, it would be better to recognize the western Euchœca as entitled to the name of *12-lineata*, Pack., and raise it to specific rank. At the close of his remarks under this species he says: "It may be found to intergrade with *E. perlineata* of the Eastern States. It is a little larger, with more acute fore wings than that species or variety (?)" He might have added, by its colour also, which is white, as he describes it, while *perlineata* is decidedly bluish-ashen; nor did he refer to Nomenia, for that species is noticeably *smaller* than *perlineata*. By these points it is easily separable to my eye. This situation leaves Nomenia sp. undescribed.

To-day I received a letter from Mr. Prout, in which, after acknowledging receipt of my specimens, he says:

"*Comptaria*, Walk., *is not* =*perlineata* (that is my Catskill Mt species I had sent him labelled *perlineata*). This is certissime!

"IF it is not exactly =*salienta*, Pears. . . . it is at least so close to it that my eye fails to detect any difference WHATEVER."

The capitals are his, not mine, and it follows that if *salienta* is *comptaria*, Walk., then *perlineata* of Packard, of which it is a synonym, must be also.

It will be seen by this statement of facts that Dr. Hulst was, after all, correct in his determination of *perlineata*, Pack., as a synonym of *comptaria*, Walk. So that if we accept the dictum of Dr. Taylor,[3] which he lays down so emphatically, that his listing should "replace Nos. 3330 and 3331 in Dyar's Catalogue," we will find ourselves very much in error. And here I will answer his question, "whether I will follow Hulst and accept the other synonyms placed with *perlineata* under *comptaria*, Walk.?" Certainly not. Because Dr. Hulst was right in one case does not make him right in all, nor do the errors he made discredit him entirely. It is necessary to note them, and I will continue to publish them, but comment I refuse to make, since he is not here to answer for himself. A description of the species involved follows :

Nomenia unipecta, n. sp.—Front seal-brown, above gray and clear white scales mixed. Palpi short, gray and white scaled, tip seal-brown. Antennæ gray, unipectinate, apex simple in ♂, in ♀ filiform simple. Collar, thorax above, patagia and abdomen above, dull white, mixed with dark gray or brown scales, these having a tendency to gather in spots on thorax and abdomen, but they do not form a fixed pattern ; under parts lighter, the fore and middle tibiæ washed with seal-brown, hind legs whitish. Fore wings with costa long, so that they appear sharp at apex, the outer margin receding almost straight. Colour grayish-ash, darker at base and along costal region, crossed by about ten waved dark gray lines, angled at costa, their general direction being straight across the wing. Preceding the discal space, which is narrow and paler, are four lines, the first slightly curved outward, the second nearly straight, some distance from it, the last two close together. Extra discal line sharper and darker than any other, starting at small angle from costa, it bends outward a little opposite cell, and from the lower end of the curve its course inclines toward hind angle. Two heavy shade lines follow this close to it and each other, and between them are scattered brown scales, not prominent, wanting entirely in many specimens, but forming as a whole a dark streak crossing the wing. Sub-terminal shade lines heavy and distinct, much waved; between this and border often occurs another less distinct shade line. An intervenular sharp black line borders both wings. Fringes

3 Can Ent., Vol. 37, p. 411.

dusky. The veins are marked where lines cross with fine black dashes, more generally beyond discal space. Hind wings well extended, rounded as in Euchœca, paler dusky-white, crossed beyond cell by four indistinct curved gray lines, much broken and waved, the inner crossing at end of cell and quite distant from the others. Discal dots wanting in most examples, sometimes discernible on fore wings. Beneath dusky. Extra discal and sub-terminal lines on fore wings are reproduced faintly, darker at costa, the latter crossing the wing, the former lost before reaching inner margin, intervenular black line on margin distinct. Hind wings with lines as above faintly reproduced, discal dots very small and faint.

Type ♂ and ♀; coll. R. F. Pearsall.

The specimens described were received through Mr. G. Franck, of Brooklyn, the male from Plumas Co., Cal.; the female from Pasadena, Cal. My examples from Pasadena are much more suffused and darker than those from other parts of California.

Euchœca exhumata, n. sp.—In form a miniature of *V. cambrica*, about one-half its size. The texture of the wing is much heavier than any other species in the genus, as much so as in *cambrica*. Front broad, rounded, dark seal-brown above, mixed gray and white; palpi short. Antennæ compressed ciliate in ♂, simple in ♀. Colour chalky-white, not shining, with gray and black scales intermixed, these forming into about six diffuse waved lines, crossing both wings. Of these the basal and extra discal are mostly black and heavier. Basal line on fore wings forms a regular outward curve from costa to inner margin, without angle or waving. Within this are three or four wavy, paler gray lines, giving to this section quite a dark appearance. Beyond the basal line the wing is generally a clear gray, sometimes white. The extra discal line is black, with a large angle below costa to cell, then forms a complete semicircle opposite cell, from lower point of it running straight to inner margin. Outside of this, and parallel with it, and sometimes of the basal line as well, there is a line of yellow-brown scales, interrupted on the veins by heavy black dashes, the two opposite cell being large and diffuse. There follows a clear white space, like a waved line, crossing both wings, and conspicuous in all specimens. Subterminal line of darker scales, heavy at costa, sometimes entire, sometimes fading out opposite cell. Subterminal space clear light gray, darker in suffused examples. Fringes long dusky-white. An intervenular black line just within the margin of both wings. Hind wings with basal portion clear gray, the basal line of fore wings often continued with a slight curve to inner margin, as an indefinite

waved line. Extra discal line distinct, less so at costa, with a large angle to cell, then curved boldly outward, reaching in a straight or wavy line to inner margin, about two-thirds from base. Outside this and parallel is a gray shade line replacing the brown line of fore wings. Often a few brown scales appear in this line, visible under lens. A conspicuous white line-like space follows the extra discal line, beyond which the single subterminal is more or less distinct, but does not dissolve into points in any of my specimens. Discal dots round and black, usually distinct on fore wings, smaller and sometimes wanting on hind wings, in the latter never included in the basal line, as in *comptaria*, Walk. Beneath dusky, the extra discal and subterminal lines distinctly reproduced on both wings, the space between them being less dusky, often the basal line is faintly shown. Intervenular line at margin faint but apparent. Discal dots obvious. Legs dusky, fore tibia dark gray, tarsi ringed with yellowish. Abdomen in ♂ above dull white, each segment anteriorly ringed with dark gray, beneath dusky-yellowish. Anal tuft yellowish, in ♀ dull white, not ringed, dusky at base.

Type ♂ and ♀; coll. R. F. Pearsall.

I have before me 25 ♂'s, 10 ♀'s, taken in the Catskill Mts., from June 4 to July 15. As compared with *comptaria*, Walk., the wing texture is much heavier, the ground colour clear white, not bluish-ash, and the lines diffuse. One male is entirely suffused with dark gray and brown scales, the conspicuous white line beyond extra discal showing out vividly; indeed, the tendency to suffusion is a characteristic of the species, and makes intelligent description most difficult. The large round spot opposite cell, so marked a feature in *lucata*, is shown to a less degree in this species, but combined with a wide white discal space it has produced the form confounded with the latter, and easily distinguished from it by the marginal intervenular line not present in *lucata*.

The species concerned will, I trust, finally rest as I now place them.

Nomenia unipecta, Pearsall, n. sp.
Euchœca comptaria, Walker.
= perlineata, Packard.
= salienta, Pearsall.
Euchœca 12-lineata, Packard.
Euchœca exhumata, Pearsall, n. sp.

During the preparation of this paper more material has come to me through the kindness of Dr. Wm. Barnes. He sends me examples of *comptaria* (=*perlineata*, Pack.) taken as far west as Quincy, Ill., the

farthest western point I know. Besides examples of *Nomenia unipecta*, Pears., from California, there are three specimens belonging to this interesting genus, taken by Dr. Barnes at Glenwood Springs, Colorado, which he suggested should constitute a new species. After a careful study I cannot accept this view, but have designated it :

Nomenia unipecta, var. *secunda*, Pears.—It differs from the type in these respects : About one-third larger, the body and fore wings of a dark, dusky-slate, without the sheen of California examples ; hind wings somewhat lighter. On both wings the lines are sharper, and on the fore wings the brown scales which follow the extra basal and discal lines are more evident. Beneath I can discover no difference from my dark specimens taken at Pasadena. Its darker opaque hue, sharper lines, and larger size distinguish it from typical *unipecta*.

The genus Euchœca contains other errors. For instance, *albovittata*, Guen., has nothing in common with this group, either in appearance or habits. It goes into the genus Trichodezia, Warren, of which it is the type. Dr. Hulst failed to observe the distinguishing marks of this genus, and therefore discarded it.[4] They are present as sexual characters in the male, and quite apparent in fresh specimens. The venation of hind wings is also quite distinct. With this may go *Californiata*, but I have no male of it for comparison. A later paper will be devoted to the genus as a whole.

Association of Economic Entomologists. — The recent meeting in New Orleans was a very successful one, over thirty members being present. The next meeting will be held next winter in New York City, in conjunction with the A. A. A. S. The following officers were elected for the ensuing year:

President, A. H. Kirkland, Malden, Mass.; 1st Vice-President, W. E. Britton, New Haven, Conn.; 2nd Vice-President, H. A. Morgan, Knoxville, Tenn.; Secretary-Treasurer, A. F. Burgess, Columbus, Ohio. For Member Committee on Nomenclature, to serve three years : Herbert Osborn, Columbus, Ohio. For Members Council, A. A. A. S.: H. E. Summers, Ames, Iowa, and E. A. Schwartz, Washington, D. C.

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4 Trans. Am. Ent. Soc., vol. 23, p. 274.

NEW BEES OF THE GENUS COLLETES.

BY MYRON H. SWENK, LINCOLN, NEBRASKA.

Colletes clypeonitens, n. sp.— ♀. Length 11 mm. Clypeus prominent, polished, narrowly medially sulcate, its punctures coarse but scattered and not forming striæ, its apex slightly emarginate and preceded by a transverse rim. Malar space one and one-half times as long as broad, finely striate. Antennæ black, the flagellum brownish beneath, joint 3 decidedly longer than 4. Face dull, finely and feebly punctured, its pubescence dense and erect, dull soiled gray, becoming whitish about clypeus. Vertex shiny, minutely punctured. Cheeks dull, striate like malar space, with long white hair and short appressed pile about orbits. Prothorax without an apparent spine. Punctures of mesothorax small and widely separated, a very large polished disk subimpunctate. Scutellum finely separately punctured, these closest along posterior border. Postscutellum finely densely punctured. Pits on superior face of metathorax very irregular and poorly defined, apparently very long and narrow, medially on a broadened area. Enclosure funnel-shaped, polished, smooth, the bowl convex. Pleura shining, with fine, well separated punctures. Pubescence of thoracic dorsum dull yellowish gray, whitish on pleura, metathorax, postscutellum and below. Tegulæ yellowish testaceous. Wings clear, nervures and stigma dark brown, the former becoming yellowish at base, with the costal nervure entirely yellow. Abdomen parallel-sided, first segment shining, finely, rather indistinctly, scatteringly punctured, following segments finely, closely, indistinctly punctured. Tergum with a fine, very dense, short and appressed pile practically concealing the surface between the contrasting, very dense, shaggy fasciæ, all of a dull gray colour, basal segment with long white hairs, segments 3–6 with white bristles, 6 bare of appressed pile. Venter shining, not banded. Legs black, with white pubescence, that on posterior femora and tibiæ very long and quite dense, carrying much pollen, outer tibial spur not pectinate, both spurs short and yellow, claws rufous, with the inner tooth submedian, front coxæ without spines.

Type.—Los Angeles, California (Dr. Davidson), 1 ♀ specimen.

There is no other species known to me, except the following, which shows close relationship to this one, which is very distinct in its sparsely punctured, non-striate clypeus, long malar space and densely pilose tergum. On the whole its nearest relative is probably *C. delodontus*, Viereck, or *C. albescens*, Cresson.

February, 1906.

Colletes petalostemonis, n. sp.— ♀. Length 7–8 mm. Very like to *C. clypeonitens*, to which it is most closely related, but differs as follows: Clypeus not sulcate nor its apex emarginate. Malar space about as long as wide. Flagellum merely fuscous below, its first joint subequal to its second. Vertex with distinct punctures of two sizes. Punctures of face distinct. Mesothorax similarly, but more coarsely punctured, those on pleura coarse and close, scutellum coarsely and sparsely punctured posteriorly. Pits on superior metathoracic face even more irregular, and the median broadening much more pronounced. Bowl of enclosure very convex, bulging. Wings white, nervures yellow, becoming dark toward the apex, the stigma large, fuscous. Abdomen similarly shaped, but much more coarsely punctured, these very distinct and quite well separated on segment 1, fine and close on 2, indistinct on following segments. Tergum with similar appressed pile. Entire pubescence of a more silvery, less yellowish cast, tinged with the latter colour slightly on thoracic dorsum only.

♂. Length 7 mm. Clypeus concealed by long, dull white pubescence. Malar space slightly over twice as long as wide. Flagellum brown below, its first joint two-thirds as long as its second, both black, the brown joints over twice as long as wide. Abdomen very coarsely punctured, especially on segment 1, segments 1–6 with broad white apical fasciæ, the spaces between with thin pale pile not nearly concealing the surface, basal segment with long white hair, very erect, denser laterally. Otherwise essentially like the ♀.

Types.—Warbonnet Canon, Sioux County, Nebraska, July 20, 1901 (♀), July 13, 1901 (♂), on *Petalostemon candidus*. (M. Cary.)

Paratypes.—Glen, Sioux County, Nebraska, August 9, 1905, on *Petalostemon candidus*, 4 ♀; do. August 14, 1 ♀; 40 miles north of Lusk, Wyoming, July, 1895, (F. H. Snow) ♀, ♂. This species seems to be oligotropic on *Petalostemon candidus*, and is not common even where the plant is abundant.

Colletes solidaginis, n. sp.— ♀. Length 9 mm. Head very short and broad, the eyes large. Vertex scarcely depressed, minutely punctured, its sides bare, the hairs between the occeli long and erect. Clypeus somewhat shiny, uniformly slightly convex, roughened by close, coarse punctures which form irregular striæ, the apical rim prominent, intensified by a transverse depression immediately preceding it, covered with a sparse, short pale ochraceous pubescence. Front covered with a short, dense, pale ochraceous pubescence, concealing a dull, finely-roughened surface,

that below antennæ yellowish white, the cheeks with a pale whitish pubescence and the surface slightly shiny and finely punctured. Malar space so short as to be almost wanting. Antennæ black, with the flagellum below beyond the second joint dull brownish to ferruginous, its basal joint but a shade, if any, longer than the second.

Thorax above very densely covered with a short, erect, bright fulvo-ochraceous pubescence, wholly concealing the surface, not at all mixed with dark hairs, longer and denser on postscutellum, paling on the sides to grayish white below. Prothoracic spines apparently wanting, mesothorax evenly punctured on a shining surface, the punctures very close and distinct, slightly sparser on a discal space, the posterior margin very finely and densely punctured. Scutellum polished and impunctate at base, elsewhere with close, coarse, rounded punctures, the postscutellum dull and finely roughened. Superior face of metathorax separated from the posterior face by an irregular rim, and divided into a series of about a dozen shining pits, which are narrow, crowded and imperfect on the sides, but quite perfect and about square medially. Posterior face with the sides shiny, weakly and scatteringly punctured, with long, pale ochraceous hairs becoming very dense laterally, the enclosure funnel-shaped, highly polished and shining, the bowl more or less ridged at the sides and base, the neck perfectly smooth, much longer than wide at base. Pleura shiny, with fine crowded punctures concealed by a dense ochraceous pubescence. Tegulæ pale testaceous. Wing short, hyaline, the nervures and stigma honey yellow. Legs slender, black, sometimes tinged with brownish on tarsi and ends of tibiæ, the pubescence short, sparse, grayish white. Front coxæ with long hairy spines. Outer tibial spurs distinctly pectinate, yellow. Claws dark, medially toothed. Abdomen with the sides subparallel, above densely covered with a very short and appressed and ochraceous pile which conceals the surface, the first segment with long dense ochraceous hairs at base and sides, its middle more sparsely pubescent and partially exposing a shining impunctate surface. The apical margins of the segments are not depressed, but have the pubescence much denser than elsewhere, forming noticeable fasciæ concolorous with the rest of the pubescence, the venter with very narrow pale fasciæ or fringes on the apical margins, apical segment bare, contrasting,

♂. Length 6–7 mm. Resembles the ♀ except in the following points: Pubescence whitish, strongly tinged with yellowish on sides and dorsum of thorax, in general much sparser than in ♀, the clypeus covered with a

long, dense, pale yellow pubescence, becoming whitish about base of antennæ; flagellum ferruginous beyond the first joint, which is less than half as long as second, the median ones twice as long as broad; mesothorax more finely and sparsely punctured, a large, shining, impunctate discal space with scattered punctures laterally; legs shining black except for the ferruginous tarsi and posterior knees; abdomen slender, its first segment very polished and shiny, practically impunctate, with long pale hairs, especially basally, following segments duller, indistinctly punctured, segments 1–6 with rather narrow and loose fasciæ of yellowish white pubescence continued very narrowly on venter, sparse, very short, pale hairs between, apex practically nude.

Types.— Lincoln, Nebraska, July, ♀, ♂.

This species flies at Lincoln in July and early August, visiting the flowers of *Solidago Missouriensis*. Its nearest ally seems to be *C. Wilmattæ*, Ckll., which is an oligotropic visitor of *Petalostemon*, and which flies at the same time; it is readily distinguished from that species by smaller size, dark legs, normal thoracic pubescence, etc.

Colletes ochraceus, n. sp.— ♀. Near to *C. solidaginis*, but easily distinguished from that species as follows: Larger, length 11 mm. Clypeus distinctly sulcate medially, especially towards the apex, and more coarsely punctured. Antennæ rather shorter and heavier, wholly black. Vertex with a few large punctures scattered on a minutely punctured surface. Pubescence of thoracic dorsum only slightly tinged with fulvous. Enclosure extremely small, its bowl shining but very small and irregularly roughened, the neck long and narrow. Sides of posterior face of metathorax strongly and rather closely punctured, the pubescence yellowish white. Nervures and stigma yellowish brown. Legs black, with silvery pubescence, the pectination of the hind spur very distinct, with about a dozen teeth.

Type.—Southern California (D. A. Saunders), one ♀ specimen.

Colletes rufithorax, n. sp.— ♀. Length 14–15 mm. Differs from *C. thoracicus* as follows: Clypeus more coarsely and striately punctured, especially apically, vertex with punctures of two conspicuously distinct sizes; punctures on cheeks coarse and well separated on a finely striate surface; joint 3 of antennæ = 4; malar space slightly longer; wings heavily clouded, nervures fusco-ferruginous; pubescence of face above clypeus strongly tinged with orange, that on thorax above brighter, more rusty red;

outer surface of posterior tibiæ with black hairs among the longer pale ones; abdominal fasciæ thinner.

♂. Length 10–12 mm. Distinguishable from the ♂ of *thoracicus* by its larger size; much heavier and broader head; longer malar space, two-thirds as long as broad; shorter antennæ, falling short of metathoracic truncation, and with joint 3 one-half as long as 4; legs much less polished; abdomen with basal segments less regularly and more coarsely punctured, the second segment only a little more finely punctured, the fasciæ narrower, looser, more grayish.

One aberrant female from Clementon is only 12 mm. long, has rather clearer wings and a narrower, more polished abdomen. I do not, however, regard it as distinct.

Types.—6 ♀ ♀, 7 ♂ ♂, all taken by Mr. H. L. Viereck in New Jersey, as follows: Ocean City, June 19, 1901, 1 ♀ on wild cherry and 2 ♂ ♂ on poison ivy; Avalon, June 9th, 3 ♀ ♀; Westville, June 15th, 1 ♀; Clementon, May 9, 1899, 1 ♂, June 2, 1901, on sand myrtle, 1 ♀, May 14, 1901, on sand myrtle, 1 ♂, May 17, 1901, 2 ♂ ♂; Mamuskin, May, 10, 1903, 1 ♂. I have also two ♂ ♂, taken by Rev. Birkmann at Fedor, Texas, April 19, 1902, and March 21, 1904, and a ♂ from Anglesea, N. J., May 28, 1905. (E. Daecke.) Probably a species characteristic of the Austroriparian life zone.

Colletes pulcher, n. sp.—♂. Length 14 mm. With a general resemblance to *C. thoracicus* ♂, but very much larger; clypeus coarsely striato-punctate, covered with a dense beard of silky, yellowish white hair, that above clypeus dense, erect and strongly tinged with orange; vertex with sides depressed, finely, densely punctured, except on a narrow subimpunctate spot contiguous to lateral ocelli; face coarsely punctured; cheeks with coarse, close, rather indistinct punctures; malar space striate, two-thirds as long as broad; antennæ heavy, reaching well beyond tegulæ; joint 3 one-half as long as four; thorax sculptured essentially as in *thoracicus;* pubescence of thorax above bright rusty red, that down sides of metathorax pale orange, that on pleura, legs and below grayish-white; wings hyaline, well clouded apically, nervures reddish-brown; spurs yellowish, the outer one finely but very distinctly pectinate; abdomen polished, elongate oval, first segment with small, distinct, well-separated punctures and sparse long grayish pubescence, denser laterally, second and third segments punctured

much like first, but more closely and less distinctly so, following segments indistinctly punctured; apical margins of segments 1–3 slightly depressed laterally, of segments 1–5 with narrow grayish-white fasciæ, interrupted medially on 1, and continued as fringes on venter; segments 4–7 with elongated white bristles on margins.

Type.—One ♂, Fedor, Texas, March 19, 1904 (Birkmann). A very distinct and exceedingly handsome species.

Colletes brachycerus, new name.

Colletes brevicornis, Perez (Actes. Soc. Linn. Bordeaux, Vol. 58, p. ccxxvi, 1903), is preoccupied by a North American species, *C. brevicornis*, Robertson (Trans. Acad. Sci., St. Louis, Vol. VII., p. 315–316, 1897). The above name is, therefore, proposed for the European species.

GUESTS OF SPITTLE-INSECTS.

Insects of the family Cercopidæ, genus Clastoptera or one closely allied, were very common in this region last summer, and the masses of froth in which the clumsy larvæ splash their way to maturity and activity were everywhere in evidence on the twigs and leaves of the wild hazel, especially where this bush fringed the timber.

One hot July day, while annoying some of these semi-amphibious infants by poking into their unpleasant habitations, I noticed some small dipterous larvæ that were apparently enjoying life under the same conditions as the hemipter that built the foam. These flies were evidently able to go through the life-cycle among the bubbles, for their little brown pupæ were there, glued fast to the leaves by the drying of the froth. When taken home and reared they proved to be of the species *Drosophila sigmoides*, Loew, mentioned in Aldrich's Catalogue of the Diptera as occurring in Texas, and collected here in Minnesota possibly for the first time.

The froth mass seemed to afford ample room for the owner and its uninvited guests, and possibly neither knew that the other was there. Even if a predatory wasp should carry off the Cercopid there would probably be enough dampness remaining to enable the flies to reach maturity among the exuviæ of the host, with the possible aid of the dew and rain to keep them moist.

C. N. Ainslie, Rochester, Minn.

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALBERTA.

(Continued from Vol. XXXVII, page 252.)

408. *Autographa Sackeni*, Grt.—Rare. A ♂ and two ♀ ♀ are labelled July 12th to 25th, taken in different years. At light, and flying in sunshine. The ♂ bears Dr. Ottolengui's label. As a matter of fact, this and the preceding species were returned to me bearing the wrong labels. The error was quite obvious from the figs. in Dr. Ottolengui's paper, so I reversed them. His letter to me at the same time convinced me as to the lapsus. A ♂ which hatched out on July 23rd, 1902, from a larva found feeding on *Potentilla fruticosa* a few weeks previously, has a broader black border on secondaries, and differs slightly in the sign, but otherwise looks the same.

409. *A. Snowi*, Hy. Edw.—I have three specimens dated July 1st to 12th, from the "Billing's Mill" locality, where it seems to fly in company with *Syngrapha ignea*, but in fewer numbers. I never took the species until 1903. Dr. Dyar gave me the name. Closely allied to the preceding species, and similar in pattern. Comparing them, Dr. Ottolengui says in his paper concerning *Snowi*: "It is smaller, the apex of the wing is much less produced than in *Sackeni* and the colour is different. As words do not adequately describe colour, let me resort to comparisons: The colour scheme of *Snowi* is the same as in *simplex*, the browns and reds being identical in shade. The coloration of *Sackeni* is nearer to, but not exactly the same as *ampla*.....A spot at the base of the costa is orange in *Snowi;* it is more sagittate in shape and very pale yellowish in *Sackeni*." In my specimens *Snowi* has a dark apical shade, which *Sackeni* lacks. Both are figured in Dr. Ottolengui's paper.

410. *Syngrapha devergens*, Hbn.—A splendid specimen from Mr. Bean, taken at the station level at Laggan about twelve years ago, was so named for me by Dr. Ottolengui, but is not now in my collection. Mr. Bean gave me to understand that it was common at Laggan. I have a badly-rubbed specimen of the same species taken close to the station there on July 17th, 1904, by Mrs. Nicholl. It bears some resemblance to a miniature *ignea*, but though the differences are obvious enough between good specimens, it is no use my trying to locate them with only one very bad specimen of *devergens* at hand. It is not in the least like Dr. Holland's figure of the species, which bears a suspicious resemblance to Dr.

Ottolengui's fig. of *parilis*. In his paper Dr. Ottolengui mentions *alticola* as occurring in the Northwest Territories and suggests that it may ultimately prove distinct from *devergens* of Labrador. In *alticola* I fancy he refers to the species he labeled *devergens* for me.

411. *S. ignea*, Grt.—Rather rare as a rule here on Pine Creek, but comparatively common in 1903. It seems more common westward, and I have it from well into the foothills. A day-flier, but also comes to light. Dr. Ottolengui has several specimens from here, and gives me the name. I quite fail to distinguish Dr. Holland's fig. of *Hochenwarthii* from this species, except that it is a little smaller than any of my specimens. End June and July.

412. *Reabotis immaculalis*, Hulst.—A single ♂ from Lethbridge, on July 11th, 1904, by Mr. Willing. It is a most appropriate name, as the specimen is of a quite uniform dirty cream colour on all wings, and bears not the least trace of maculation whatsoever.

413. *Erastria panatela*, Smith.—(Psyche, June, 1904, p. 60). Described from three ♂ ♂ and one ♀, one male being a co-type in my own collection, taken here at light on June 23rd, 1901, and the rest from Winnipeg. The type is with Prof. Smith. He remarks under the description: "This is one of the broad winged species, like *musculosa* or *includens*, and resembles the latter, somewhat, in type of maculation."

414. *Therasea angustipennis*, Grt.—Fairly common at light. June and July. One specimen has a distinctly yellowish shading on the costa, and otherwise differing slightly from the rest of my very short series, may really be *flavicosta*, Smith. It certainly resembles Dr. Holland's figure of that species, but I dare not separate on the one specimen.

415. *Fruva fasciatella*, Grt.—Rare. I have four specimens dated from June 7th to Aug. 5th. It varies from dull smoky to creamy-white. A smoky specimen is labelled "June 7th, sunshine," and a white one "Aug. 5th, light."

416. *Spragueia tortricina*, Zell.—A single specimen dated June 18th, 1903, has been so named by Prof. Smith. The primaries are ochre yellow, and it is almost certainly distinct from the preceding, notwithstanding the names are referred to one species in Dyar's list.

417. *Drasteria erechtea*, Cram.—Not common. Some years very scarce. Middle July and August. Treacle and light. Does not habitually fly in daytime.

418. *D. crassiuscula*, Haw.—A ♀, in fair condition, taken flying in daytime near the Red Deer River, 50 miles north-east of Gleichen, on July 5th, 1904, is without much doubt this species. A ♂, taken at the same time and place, is probably the same. I certainly have no females from nearer to Calgary, but cannot be quite so positive about males.

419. *D. distincta*, Neum.—Very common. Middle May and June. Good specimens of both sexes from the above-mentioned Red Deer River locality, dated July 6th and 8th, 1904, do not seem separable from the Calgary form. A day-flier, rarely coming to light, and still more rarely to treacle. Both sexes are figured from Calgary specimens in CAN. ENT., XXXII, pl. 5, Aug., 1900, but, unfortunately, the figures are not very clear. So far as my own local material is concerned, I am strongly inclined to let the three names given above stand for these species. I formerly had ♂ and ♀ of *erechtea* standing respectively as *erichto* (*crassiuscula*) and *erechtea*, but becoming suspicious from the fact that I only took males of one and females of the other, submitted a series of both sexes to Prof Smith, which resulted in my placing all my material from south and west of Calgary under *erechtea*. The receipt, at different times, of various specimens labelled *crassiuscula* and *erechtea* from eastern correspondents puzzled me considerably to know how the two were to be distinguished, the more so since, as I now find, the labels were about as often wrong as right. I had never seen Mr. Slingerland's paper on *Drasteria* in Insect Life, V, 87 and 88, 1892, of which Dr. Bethune has kindly sent me an extract. The author of that article, it appears, after critically examining a large number of specimens from various localities, became convinced that *erechtea* and *crassiuscula* were distinct species, about equally common, and that *oehrea* and *distincta* were varieties of the latter. He found an exceptionally striking difference in the ♂ genitalia, and another in the form of ♀ abdomen. In ♀ *erechtea* the ventral portion of the seventh abdominal segment is as long as broad, with caudal margin broadly rounded. In ♀ *crassiuscula* it is broader than long, with caudal margin broadly emarginate. In colour and maculation he differentiates them thus . *Erechtea*—fore wings above dark or light drab gray (in many females brown or olivaceous) shade, with the two large dark bands always separate, distinct and well defined towards inner margin in ♂ ; in ♀, markings always much less distinct, the subapical dentate spots never as distinct as in the ♂, or as in the ♀ of *crassiuscula*. The males are very constant. *Crassiuscula*—fore wings above either distinct violaceous, brown, or red shade, with the two large dark bands very variable, often

shading into ground colour on outer edge, or coalescing near inner margin; all markings, especially subapical dentate spots, equally distinct in both sexes. It is slightly smaller than *erechtea*, more variable, and marked alike in both sexes. After reading the above I have been able to make what I believe to be a fairly satisfactory separation of my eastern material upon this basis, and certainly find the form of ♀ abdomen a rather striking character, combined with the practical absence of subapical black spots in ♀ *erechtea*. The males are certainly darker, but those of *crassiuscula* seem to be less gray than in the other species, and in specimens where the two bands are well joined on inner margin so as to form a rude U, the reference to *crassiuscula* is probably safe. Mr. Slingerland states, however, that "specimens occur which it is almost impossible to separate by markings alone, and the structural characters must then be resorted to." In Ent. News, XV, 221, Mr. E. J. Smith states that Dr. Holland's pl. XXX, fig. 15, is not *crassiuscula* ♂, but *erechtea*. From Mr. Slingerland's papers I should judge that it might be either, with the probabilities rather in favour of the latter. Fig. 14 is certainly an excellent representation of Calgary ♀ *erechtea*.

I have so far received nothing from the east under the name of *distincta*, but have males so closely resembling the Calgary form as to make their specific difference very doubtful, and have sent out numbers of local specimens at different times without having the name questioned. But, despite this fact, and that Mr. Slingerland says that *crassiuscula* is "marked alike in both sexes," I find more tendency to a sexual colour difference in my eastern series under that name than exists in Calgary *distincta*, of which the primaries may be best described as ashen-gray. Though the form of ♀ abdomen resembles that of *crassiuscula*, the males much more nearly approximate those of *erechtea*. The bands on primaries scarcely seem to show more tendency to join, and with males alone to deal with, and knowing nothing about the different habits of the two in life, I should be almost inclined to look upon them as one seasonally dimorphic species. *Distincta* averages decidedly smaller, and is usually much grayer, but single specimens are sometimes rather hard to place without the aid of the date label. But the strong colour difference between the sexes of *erechtea* prevents any real confusion with *distincta*. The capture of the above listed typical ♀ *crassiuscula* on the Red Deer River, in company with the smaller and quite dissimilar Calgary form of *distincta*, makes it hard for me to accept them as one species.

420. *D. conspicua*, Smith. (? = *Euclidia annexa*, Hy. Edw.) Described from here, and both sexes are figured with the description. The type is at Washington. Not common. Middle May to middle June. Exclusively a day-flier. Prof. Smith states, "The species is so well marked that it cannot be mistaken. The maculation of primaries is a reduced copy of *erechtea*, much more distinct, but in the banded secondaries generic habit is abandoned, and the form is unique." He well describes the colour of primaries as "smoky, overlaid by bluish-white or gray scales, ... the markings smoky brown or blackish, contrasting." There is little difference between the sexes. Dr. Holland's figure gives an excellent idea of the species. In build it certainly looks like a *Drasteria*, with ♀ abdomen somewhat of the *crassiuscula* form, but the banding of the secondaries, including a conspicuous discal lunule, is almost as much like that of a *Syneda*. Sir George Hampson has the species from here, and tells me it is identical with the type of *Euclidia annexa*, Hy. Edw.

421. *Eculidia cuspidea*, Hbn.—Two specimens. One on Bow River, near mouth of Fish Creek, June 24th, 1894; the other on Red Deer River, about 50 miles north-east of Gleichen. June 20th, 1901. The last mentioned specimen is in my collection. Both were flying in sunshine. It is probably a prairie species, and hardly extends this far west.

422. *Melipotis limbolaris*, Geyer.—Have seen it common on the prairie, near the mouth of Fish Creek, on Bow River. I have never seen it in the hills. My specimens from there, two pairs, are dated June 25th to Aug. 4th, 1893 and 1894. Prof. Smith saw a pair of these recently, and returned them to me as this species, which name he had given me for it some years previously. Two pairs from the Red Deer River locality on July 5th and 8th, 1904, are probably the same species. The sexual dimorphism is strong, the females having a dull, washed-out appearance. Were the secondaries orange instead of creamy-white, the resemblance of the ♂ would be nearer to *divergens* or *Hudsonica* than to *limbolaris* of Dr. Holland's figures. A day-flier. Mr. Gregson records the species from the Lacombe district on the authority of Dr. Fletcher.

423. *Syneda Athabasca*, Neum.—Fairly common some years. June to middle July. A day flier. The form, of which I have also both sexes from the Red Deer River locality, is like Dr. Holland's figure, but one Red Deer ♂ and two Laggan (station level) females have orange-tinted secondaries, but do not seem to differ in maculation. These three

specimens are almost as much like Dr. Holland's fig. of *Alleni*, but are darker throughout.

424. *S. Hudsonica*, G. and R.?—A worn ♂ from Pipestone Creek, Laggan, July 16th, 1904, looked to me like a dark suffused variety of what I have listed as *Melipotis limbolaris*, and I placed it in that series. I have received, however, from Dr. Dyar as *Hudsonica*, a very closely similar ♀ from Kaslo, but, unfortunately, also rather worn. In both specimens the primaries are blacker, and secondaries much less orange than in Dr. Holland's figure.

425. *Catocala unijuga*, Walk.—Very rare at treacle, and occasionally at rest in daytime, or in houses. My only two specimens are dated Aug. 27th and 29th.

Var. *Fletcheri*, Beut.—Named after Dr. James Fletcher. Dr. Fletcher says in Rep. Ent. Soc., Ont., No. 19. p. 94, 1903, "A new variety, which was collected by Mr. T. N. Willing, of Regina, when living at Olds, Alta., about 60 miles north of Calgary. It is like the typical form in markings, but the bands on secondaries, instead of being red, are of a dark yellowish sooty-drab." I am not sure where the type of this variety is at present.

426. *C. briscis*, Edw.—Rare. Treacle, in Aug. and Sept., and occasionally at rest in daytime. I have a specimen in which the basal half of both primaries and secondaries is almost entirely black.

427. *C. relicta*, Walk.—I never met with the species until 1904, when three or four fine specimens, including both sexes, turned up at treacle and light on Sept. 3rd and 5th, which agree with a ♀ sent, named by Dr. Fletcher, from Ottawa. Mr. Gregson took two specimens at Blackfalds on Sept. 15th and 17th, 1901, which I have seen.

428. *Erebus odora*, Linn.—One ♀. Identified by Dr. Fletcher from a coloured drawing made by Miss Moodie, of Calgary, in whose possession I have seen the specimen, and who tells me that it was taken in the town of Calgary in May, 1897. The specimen is badly worn, and is, of course, a migrant.

429. *Epizeuxis Americalis*, Gn.—Common. Light and treacle. End June and July.

430. *Philometra goasalis*, Walk.—Common at light. Also flies in daytime. July.

431. *Hypena humuli*, Harr.—Very rare. Apparently double brooded. A worn specimen at treacle on Red Deer River, about 55 miles

north-east of Gleichen, June 21st. Two specimens here on Pine Creek, June 24th and Sept. 18th, 1899, the latter in fine condition.

Var. *albopunctata*, Tep.—A ♀ in fine condition, Sept. 25th, 1899.

THYATIRIDÆ.

432. *Habrosyne scripta*, Gosse.—Very rare. Three specimens only, in different years, at treacle. Middle June to middle July.

433. *Pseudothyatira cymatophoroides*, Gn., var. *expultrix*, Grt.—A ♂, in fair condition, at treacle, on July 5th, 1904, is exactly like Dr. Holland's figure.

434. *Bombycia Tearlii*, Hy. Edw.—Rare. Middle Aug. to middle Sept. Treacle. The species here is of a smooth ashen gray, almost immaculate except for the double brown t.a. and t.p. lines, and looks quite different from the green and brown *improvisa* sent me by Mr. Hanham from Victoria, B.C., which also seems to be a more heavily built insect.

NOTODONTIDÆ.

435. *Melalopha apicalis*, Walker.—Rare. I have only taken three specimens, all at rest in daytime in the town of Calgary. June 2nd to 19th. I have specimens from Cartwright, Man., and from Chicago, which are rather smaller and darker, but otherwise look the same.

436. *M. albosigma*, Fitch.—Very rare. May 21st to 31st. Light.

437. *M. Brucei*, Hy. Edw.—Rare. May 21st to June 5th. Light. Rather like *apicalis*, but differs not only by its darker colour, but also in having the second and third lines entire, and not meeting centrally. In *apicalis*, the third line springs from the second on the median vein, and is not visible as a separate line above that point.

438. *Hyperæschra stragula*, Grt.—Very rare. June 6th, 1894, June 12th and 24th, 1903. Light.

439. *Notodonta simplaria*, Graef.—One fine ♂, at light, June 18th, 1900.

440. *Pheosia dimidiata*, H.-S.—A ♀ taken at Olds, Alta., on July 7th, 1898, by Mr. T. N. Willing. Named by Dr. Fletcher.

441. *Harpyia scolopendrina*, Bdn.—A ♂ on May 31st, 1902, and a ♀ May 11th, 1901. Both at light, and perfect specimens. A ♀, crippled, bred in early June, 1905, from a pupa found on a fence in Calgary.

442. *H.* (? var.) *modesta*, Huds.—Two ♂♂ and a ♀. One ♂ labelled June 21st, and probably taken at light, the other marked "bred, 1894," without day or month. The ♀ is somewhat crippled and comes from Mr. Gregson, bearing label "June 9th, 1902, Blackfalds, Alta., bred." The names are as quite recently given me by Dr. Dyar. He had some

years ago called the same ♂ *scolopendrina* which he now calls *modesta* and Dr. Ottolengui had called a ♂ of the same species *scolopendrina*, whilst the same ♂ which Dr. Dyar now calls *scolopendrina*, Dr. Ottolengui, then named *modesta*, so I presume that the two forms are not well known. Whatever their correct names may be, I feel certain that my two forms are two species, and told Dr. Dyar so when I sent them. He wrote : "They certainly look like distinct species as you have them contrasted." Briefly described, my *scolopendrina* has the ground colour white ; has patches of fulvous scales on patagiæ, on borders to median band, and anterior to apical patch. The discal spot is narrowly linear, and there are three distinct transverse crenulate lines beyond the cell, the inner one sharply toothed. Expanse, ♂ 42 mm , ♀ 46 mm. My *modesta* have the ground colour distinctly tinged with ochreous and lack the patches of fulvous scales. The discal spot is ovate rather than linear, the three transverse lines beyond the cell are much less distinct, and the inner one is not toothed. Expanse, ♂ ♂ 38 mm., ♀ 40 mm. Dr. Holland's figure of *scolopendrina* bears a closer resemblance to this form than my No. 441.

442a. *H.* (? var.) *albicoma*, Strk.—A ♀ in fine condition taken at Lethbridge on July 11th, 1904, by Mr. Willing, which I have seen and closely examined. Whilst it is almost exactly like Dr. Holland's figure of *albicoma*, I have carefully compared it with my specimens of *scolopendrina* and *modesta*, and cannot help thinking that it must be distinct from either, though certainly nearest to *scolopendrina*. It is whiter than that form, has no fulvous scales, and the black on thorax and abdomen is more confined to the dorsal area. The central band is very narrow, and the line before it is almost entire, instead of composed of mere spots, and the two inner lines of the three beyond the cell are obsolete. With the exception of a transverse shade on the secondaries, the specimen is altogether less smoky.

443. *Gluphisia septentrionalis*, Walk.—A ♂ at light, July 5th, 1896.

444. *G. Lintneri*, Grt.—A ♀ at light, May 5th, 1900.

LIPARIDÆ.

445. *Gynæphora Rossii*, Curt.—Three specimens were bred by Mr. Gregson in 1902 from larvæ found feeding on "cottonwood" (*Populus deltoidea*, or *P. balsamifera*) in the Blackfalds district. They all emerged on the same day, June 10th, but, unfortunately, two were destroyed. The remaining specimen I have seen, and it was named by Dr. Fletcher. There can be little doubt as to its identity. Mr. Gregson

tells me that the larvæ were very dark brown, with rather short hairs, and that they pupated in the spring after hibernation. He reports the larvæ as having been almost abundant during 1903, but says that he failed in an attempt to hibernate some of them.

446. *Notolophus antiqua*, Lin.—Very rarely met with, indeed. I have only two records, both males. One was taken by myself near the mouth of Fish Creek in 1893, and the other by Mr. Hudson, head of Pine Creek, at rest on a binder, Sept. 3rd, 1903. I have not infrequently found empty cocoons, sometimes with hatched ova on them, on trunks of *Populus tremuloides*, which I believe to have been those of this species.

447. *Olene plagiata*, Walk.—Two fine males. One taken by Mr. Hudson in 1903, labelled (? July 27th), probably at light; the other July 9th, 1904, at light.

448. *Malacosoma Americana*, Harr.—A single ♀, bred on Aug. 6th, 1905, from a larva taken on the Red Deer River, north-east of Gleichen. A large number of larvæ were collected there during the first week in July by Mr. Hudson and myself, as they appeared obviously to differ from those we were so used to seeing in the Pine Creek district. Owing to an accident only one was brought to maturity. They were found commonly feeding on rose, saskatoon and wolf-willow, but I cannot recollect that we found them on true willow (*Salix*). They differed from the larva of the following species in the predominance of pale gray markings, especially in the lateral area, at the expense of black and yellow. I refer the species here, though with some doubt, owing to the resemblance of the specimen bred to a series kindly sent me under the name from Toronto by Mr. Gibson.

449. *M. fragilis*, Stretch.—The name was first given me by Prof. Smith, and Dr. Barnes has seen my series and not questioned its correctness. I cannot state positively that I have not more than one species in the series, but can draw no line. The males are normally darker than the females, and vary from pale luteous (? var. *constrictina*, Neum. and Dyar) to dark red-brown, with luteous transverse lines. The central band is nearly always darker, especially in luteous specimens, and the edges of the band usually darker than the centre. Thus, in luteous specimens the dark edges show up as lines when the luteous lines are dissolved in the pale ground. The lines are generally even. I must admit that I have specimens which I can hardly separate from some of my Ontario series of *Americana*, which seem to differ mainly in being browner, with less of the reddish tinge. The females show similar variation to the males, but run

more to luteous and less to red, and the outer line is occasionally crenulate, suggesting *Californica*, of which, however, I have not seen authentic specimens. In two females no dark colours are on primaries, except the edges of the otherwise concolorous central band, and dark marks on fringes (? var. *perlutea*, Neum. and Dyar). In some seasons the larvæ are very abundant, their nests being especially conspicuous on dwarf species of *Salix*. They also appear to favour wild gooseberry and rose, but are very rarely found on aspen. The imago comes to light from about the middle of July to the middle of August, though in nothing like the numbers that might be expected from the abundance of the larvæ. I cannot see that the form differs, in the imago at any rate, from *pluvialis*, recorded by Dr. Dyar in the Kootenai list. I have exchanged specimens with Dr. Dyar, and he says of the Calgary form: "More nearly resembles *pluvialis* than *fragilis*. Perhaps you are where the two forms run together." Some of the species of this genus seem very obscure, and I believe are more distinct in the larval stage. This I regret that I have not yet closely studied.

450. *M. disstria*, Hbn.—Mr. Hudson found a brood feeding on aspen poplar (*P. tremuloides*) in 1902, from which seven males and five females were bred, all emerging between July 31st and Aug. 2nd. I came across another brood, also upon aspen, during June of the past year (1905). Beyond these we have never met with the species. Mr. Gregson takes it in the Blackfalds district. Dr. Fletcher, in his report to the Director of Experimental Farms for 1904, states that on July 21st of that year he found two destructive colonies of what he believed to be this species on aspens, near St. Albert, ten or twelve miles north-west of Edmonton. In one case a patch of many acres was infested, and "the moths were in thousands, and were just emerging from their cocoons."

451. *Epicnaptera Americana*, Harr.—Rather rare. Middle May to middle June. Light. My only ♀ was bred from a larva found full-grown. I did not discover the food plant, but believe it to have been *Amelanchier alnifolia*, here known as Saskatoon. Rev. G. W. Taylor, of Wellington, B. C., tells me that he has often reared it on alder, but here that is far more local than the moth.

Var. *ferruginea*, Pack. One ♂ at light, April 26th, 1894, nearly three weeks earlier than my next earliest record for the species. The specimen is almost unicolorous rusty-red, with no gray shades or powdering at all.

(To be continued.)

RECORDS IN ORTHOPTERA FROM THE CANADIAN NORTHWEST.

BY E. M. WALKER, B.A., M.B., TORONTO.

The following list of Orthoptera chiefly comprises the species taken by the writer during a month's trip to the Canadian Pacific Coast in 1897. But few stops were made, most of the specimens being taken at the various stations along the line of the Canadian Pacific Railway. As a rule, but a few minutes to half an hour were spent at each stopping place, but in Manitoba and British Columbia longer periods were spent, and better opportunities were to be had for collecting.

The list also contains the names of a few specimens taken by Dr. Fletcher in British Columbia and Manitoba during 1901.

Very few specimens other than Acridiidæ were taken, as the writer was at that time inexperienced in collecting the Gryllidæ and Locustidæ. The species taken in Ontario are omitted, as they have already been recorded elsewhere.

1. *Blattella germania*, Steph.—One female, Agassiz, B. C., Sept. 9, 1897.

2. *Tet'ix granulatus*, Kirby.—Agassiz, B. C., Sept. 9, 1897, 2 males, 1 female; Winnipeg, Man., Sept. 20, 1897, 1 female.

3. *Tettix Hancocki*, Morse.—Sidney, Man., Aug. 29, 1897, 1 female.

4. *Amphitornus bicolor*, Thom.—Vernon, B. C., Sept. 10, 1897. 2 females.

5. *Chloealtis abdominalis*, Thom.—Banff, Alta., Aug. 31, Sept. 1, 1897, 2 males, 2 females; between Carberry and Neepawa, Man., Sept. 22. 3 females.

6. *Stenobothrus curtipennis*, Harr.—Brandon, Man., Aug. 29, 1897; Swift Current, Assa., Sept. 20; Banff, Alta., Sept. 1; Sandon, B. C., Sept. 16; Vernon, B. C., Sept. 10.

7. *Gomphocerus clavatus*, Thom.—Near Waldeck, Assa., Aug, 30, 1897, 1 male; Pasqua, Assa., Aug. 30, 1 male, 1 female.

8. *Mecostethus gracilis*, Scudd.—Winnipeg, Man., Sept. 20, 1897, 2 males.

9. *Arphia pseudomitana*, Thom.—Brandon, Man., Sept. 23, 1897; between Souris and Boissevain, Man., Sept. 24; between Carberry and Neepawa, Sept. 22; Maple Creek, Assa., Sept. 20; Herbert, Assa., Aug. 30; Moose Jaw, Assa., Aug. 30; near Gull Lake, Assa., Aug. 30; Vernon, B. C., Sept. 10; Victoria, B. C., Sept. 8.

10. *Encoptolophus parvus*, Scudd.—Near Waldeck, Assa., Aug. 30, 1897, 1 male, 1 female; Swift Current, Assa., Sept. 20, 1 male; Pasqua, Assa., Aug. 30, 1 male

11. *Camnula pellucida*, Scudd.—Portage la Prairie, Man., Aug. 29, 1897; Plum Coulee, Man., July 3, 1901 (Fletcher); Brandon, Man., Aug. 29; Indian Head, Assa., Aug. 30; Canmore, Alta., Aug. 31; Kananaskis, Alta., Aug. 31; Discovery Bay, Vancouver Id., B. C., Sept. 6.

12. *Hippiscus Californicus*, Scudd.—Vernon, B. C., Sept. 10, 2 males, 4 females. These specimens vary considerably in markings. One of the males and one of the females lack the yellowish stripe along the dorsal surface of the tegmina.

13. *Hippiscus zapoterus*, Sauss.—I have 1 female labelled Man., 1880, from Dr. Brodie's collection. Dr. Scudder writes that he has a specimen from Mill Valley, Man., Aug. 10, 1900.

14. *Dissosteira Carolina*, L.—Vernon, Sept. 10, 1 male, 1 female. The female is an extremely larger example, much larger than any I have seen from the east. Ordinary examples were common elsewhere in B. C.

15. *Spharagemon collare*, Scudd.—Between Souris and Boissevain, Man., Sept. 24, 1897; near Brandon, Man., Sept. 23; Rush Lake, Assa., Aug. 30; Moose Jaw, Assa., Aug. 30; Morse, Assa., Sept. 20; Chaplin, Assa., Sept. 20; Parkbeg, Assa., Aug. 30, Sept. 20. This is a very common species on the prairies, especially on the semi-arid parts. It shows great variation in colour and markings, and in the height of the median carinæ of the pronotum, but all the specimens seem to belong to the typical race *collare*. Most of the Assiniboia specimens are collared, but many of the Manitoba ones lack this feature and are more uniform in coloration. The median carina is generally lower. The Manitoba specimens were taken, as a rule, on sandy prairies; those from Assiniboia everywhere in the semi-arid country.

16. *Metator pardalinum*, Sauss.(?)—Near Waldeck, Assa., Aug. 30, 1897, 1 male. This is a yellow-winged specimen, and is probably the same as *Mestobregma maculosum*, Sauss., which is reported from Alberta.

17. *Mestobregma Kiowa*, Thom.—Between Souris and Boissevain, Man., Sept. 24, 1897; 10 miles north of Brandon, Man., Sept. 23; Morse, Assa., Sept. 20; Moose Jaw, Assa., Aug. 30; Indian Head, Assa., Aug. 29.

18. *Conozoa Wallula*, Scudd.—Vernon, B. C., Sept. 10, 2 males, 1 female.

19. *Trimerotropis caeruleipes*, Bruner?—Nanaimo, B. C., Sept. 7, 1897; Duncan's, Vancouver Id., B. C., Sept. 7; Discovery Id., near Victoria, B. C., Sept. 6.

This is a very common insect on Vancouver Id., but I did not meet with it elsewhere.

20. *Trimerotropis monticola*, Sauss.—Near Waldeck, Assa., Aug. 30, 1897; Moose Jaw, Assa., Aug. 30; Morse, Assa., Sept. 20; near Gull Lake, Assa., Aug. 30; Vernon, B. C., Sept. 10.

Very common on the semi-arid parts of the Great Plains, associated with and closely resembling the collared variety of *Spharagemon collare*.

21. *Trimerotropis Bruneri*, McNeill.—Swift Current, Assa., Sept. 20, 1897, 1 male.

22. *Trimerotropis longicornis*, Walk.—Vernon, B. C., Sept. 10, 1897, 2 males.

23. *Trimerotropis vinculata*, Scudd.—Revelstoke, B. C., Sept. 17, 1897; Vernon, B. C., Sept. 10; Agassiz, B. C., Sept. 9.

24. *Trimerotropis sordida*, Walk.—Moose Jaw, Assa., Aug. 30, 1897; near Waldeck, Assa., Aug. 30; Morse, Assa., Sept. 20.

25. *Circotettix suffusus*, Scudd.—Donald, B. C., Sept. 3, 18, 1897; Revelstoke, B. C., Sept. 11; Rossland, B. C., Sept. 12; Robson, B. C., Sept. 12; Vernon, B. C., Sept. 10; Agassiz, B. C., Sept. 8; Discovery Id., near Victoria, B. C., Sept. 5.

Very common on rocky and sandy places in B. C.; quite similar in habitat, flight and stridulation to *C. verruculatus*, Kirby.

26. *Circotettix lobatus*, Sauss.—Vernon, B. C., Sept. 10, 1897, 3 males, 1 female. A rare species, not known before from Canada. It makes a very loud but less harsh sound than *C. suffusus* and *verruculatus*. They were taken in company with a number of other Oedipodinæ from the low, barren, semi-arid hills of the Okanagan district.

27. *Circotettix carlinianus*, Thom.—Pasqua, Assa., Aug. 30, 1897, 1 female.

28. *Podisma Dodgei*, Thom.?—Laggan, Alta., 7,000 ft., Sept. 19, 1897, 1 female.

This specimen is considerably smaller than typical *Dodgei*, and is somewhat differently marked. It is quite likely a new species.

29. *Melanoplus Alaskanus*, Scudd.?—Vernon, B. C., Sept. 10, 1897, 1 male. This specimen was sent to Dr. Scudder, who wrote me that it was either *Alaskanus* or a new species near it. The subgenital

plate is very long—longer than that of the specimen of *Alaskanus* figured in Scudder's Revision of the Melanopli.

30. *Melanoplus affinis*, Scudd.—Vernon, B. C., Aug. 23, 1901, 1 female (Fletcher); Nicola Valley, B. C., Aug. 20, 1901, 2 males, 2 females (Fletcher).

31. *Melanoplus bilituratus*, Walk.—Donald, B. C., Sept. 3, 1897; Vernon, B. C., Sept. 10; Discovery Id., near Victoria, B. C., Sept. 6; Duncan's, Nanaimo and Riddell, Vancouver Id, B C., Sept. 7; Kelowna, B. C., Aug. 23, 1901 (Fletcher).

Extremely common on the Pacific Slope, where it seems to be the most abundant grasshopper.

32. *Melanoplus atlanis*, Riley.—Near Rosebank, Man., July 4, 1901 (Fletcher); Moose Jaw, Assa., Aug. 30, 1897; Parkbeg, Assa., Aug. 30; Kananaskis, Alta., Aug. 31; Banff, Alta., Sept. 1; Agassiz, B. C., Sept. 9; Vernon, Aug. 23, 1901, 1 male, very large (Fletcher); Sept. 10, two females, very large.

The large specimens from Vernon may possibly belong to another species, but I can find no structural differences from *atlanis*.

33. *Melanoplus spretus*, Uhler.—Between Brandon and Souris, Man., Sept. 23, 1897, 2 males; near Rosebank, Man., July 4, 1901, numerous mature specimens and a few nymphs (Fletcher).

34. *Melanoplus Dawsoni*, Scudd.—Between Souris and Boissevain, Man., Sept. 24, 1897; between Carberry and Neepawa, Man., Sept. 22; Brandon, Man., Aug. 29; Carberry, Man., Aug. 29; Portage la Prairie, Man., Aug. 29; Bergin, Man., Aug. 29; between Chaplin and Parkbeg, Assa., Sept. 20, 1897.

One of the common grasshoppers of the prairies.

35. *Melanoplus fasciatus*, Walk.—Banff, Alta., Sept. 1, 2, 1897. Rather common in open woods.

36. *Melanoplus femur-rubrum*, DeG.—Portage la Prairie, Man., Aug. 29, one male; Brandon, Man., Aug. 29, one male, one female; Moose Jaw, Assa., Aug. 30, one male; near Waldeck, Assa., Aug. 30, one male; Agassiz, B.C., Sept. 8.

All the specimens from the Plains, i.e., all but the one from Agassiz, are of small size.

37. *Melanoplus extremus*, Walk.—Plum Coulee, Man., July 3, 1901, one male, short-winged (J. Fletcher).

38. *Melanoplus compactus*, Scudd.—Between Carberry and Neepawa, Man., Sept. 22, 1897, two males, three females.

39. *Melanoplus Packardii*, Scudd.—Nicola Valley, B.C., Aug. 20, 1901, one male (Fletcher).

40. *Melanoplus infantilis*, Scudd.—Between Souris and Boissevain, Man., Sept. 24, 1897; near Brandon, Man, Sept. 23; between Chaplin and Parkbeg, Assa., Sept. 20, 1897; Moose Jaw, Assa., Aug. 30; Indian Head, Assa., Aug. 29; near Waldeck, Assa., Aug 30.

Very common on the simi-arid plains of Assiniboia.

41. *Melanoplus luridus*, Dodge.—Near Rosebank, Man., July 4, 1901, one female (Fletcher). Between Brandon and Souris, Man., Sept. 23, 1897, one female; 10 miles north of Brandon, Sept. 23, one female.

42. *Melanoplus bivittatus*, Say.—Near Rosebank, Man., July 4, 1901, one male (Fletcher); Rush Lake, Assa., Aug. 30, 1897, one female; Vernon, B.C., Sept. 10, one female. These all have glaucous hind tibiæ.

43. *Asemoplus montanus*, Bruner.—Vernon, B.C., Sept. 10, 1897, one female; probably this species, according to Dr. Scudder. It was taken in a small low wood of poplar, Douglas fir, etc., surrounded by dry barren hills.

44. *Asemoplus nudus*, Walk.—Sandon, B.C., Sept. 16, 1897, two males, one female; Laggan, Alta., Sept. 19, one male, four females.

45. *Scudderia furcata*, Brunn.—Agassiz, B.C., Sept. 9, 1897, common.

46. *Xiphidium fasciatum*, DeG.—Boissevain, Man., Sept. 24, 1897; Agassiz, B.C., Sept. 9.

47. *Cyphoderris monstrosa*, Scudd.—Banff, Alta., Sept. 2, 1897, two males (one immature). The mature male was found dead, but fresh, lying in a pool of water from a hot sulphur spring on the side of Sulphur Mountain. The other was found under a stone close to the same pool.

48. *Nemobius fasciatus*, Scudd.—Var. *abortivus*, Cand.—Common everywhere on the prairies—Man., Assa., Alta.

49. *Gryllus abbreviatus*, Serv.—Near Victoria, B.C., Sept. 6, 1897, three males. These appear to be typical *abbreviatus*, although this species is not recorded from the Pacific coast. Unfortunately no females were taken.

At a meeting of the Mount Royal Entomological Club, held on the 16th Dec. last, Mr. G. R. Southee reported the capture of *Sphinx luscitiosa*, Clemens, at Montreal, on July 3rd and 17th last. This moth has always been very rare in that locality and its capture was a surprise to several of the Montreal collectors.—G. CHAGNON.

FIVE NEW CULICIDÆ FROM THE WEST INDIES.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Stegomyia mediovittata, n. sp.—Proboscis black, unmarked, palpi black scaled, in the male the bases of the joints white scaled, in the female only the apices of the joints are white ; inner side of first antennal joint white scaled, scales of occiput black, a median line of white ones, those on the sides yellow and white. Thorax brown scaled, a median line of white ones, which is divided into two branches on the posterior fifth of the mesonotum ; on either side of this line is a stripe of dark brown scales, followed by a line of light yellow scales, which become whitish on the posterior portion of the mesonotum ; a broadly interrupted line of white scales midway between this line and the insertion of the wing, and a similar line just above this insertion, a spot of white scales on the humerus, and several similar spots on the pleura ; scutellum with a spot of white scales on each of its three lobes. Abdomen black scaled, with a bluish reflection, a spot of white ones near base of sides of the last four segments, and a few white scales at apex of the last segment. Legs black scaled, a line of white ones on anterior and posterior sides of each femur, a spot above middle of anterior side of each tibia, the base of the first two joints of the front and middle tarsi and the base of each joint of the hind ones white scaled; tarsal claws of the female simple, those of the front and middle tarsi of the male with one tooth under one of the claws, none under the other, claws of the hind tarsi simple. Wings hyaline, the scales black. Length about 3 mm.

San Domingo, West Indies. Thirty-four specimens, collected by Mr. August Busck. Type No. 9138, U. S. National Museum.

Stegomyia Busckii, n. sp.—Proboscis and palpi wholly black, no white scales on the first antennal joints, scales of occiput brown, a median stripe of yellow ones, changing to white anteriorly, the sides of occiput bordered with white ones, the lower half largely yellow scaled. Thorax brown scaled, a median pair of widely-separated yellow scaled lines on the anterior three-fourths of the mesonotum, and between each of these and the adjacent wing is a line of similar scales on the posterior half, an interrupted line of white scales toward the sides of the mesonotum, and several spots on the pleura ; scutellum brown scaled, and with a median stripe of white ones. Abdomen black scaled, with a tinge of bronze ; venter yellow scaled, and with a lateral spot of white scales on the last three segments. Legs black scaled, those on under side of femora pale

yellow, a dot of white scales at apex of each femur and tibia, bases of first three joints of the hind tarsi white scaled; tarsal claws in both sexes as in *mediovittata*. Length about 3 mm.

San Domingo, West Indies. A female and two males, collected by Mr. August Busck, after whom this handsome species is named. Type No. 9139, U. S. National Museum.

Tæniorhynchus palliatus, n. sp.—Proboscis wholly black scaled, palpi mixed black and yellow, occiput and mesonotum golden-yellow scaled, a large spot on posterior half of mesonotum almost devoid of scales (rubbed?), pleura with several spots of whitish ones. Abdomen black scaled, with a strong tinge of purple, a spot of yellow scales at bases of the third and fourth segments, and of white ones at base of each of the following three segments, a patch of white scales in the outer front angles of each segment; venter black scaled, and with a median stripe of yellow ones on the first four segments. Legs black scaled, those on the under side of each femur yellow; a spot of white scales at apex of each femur; base of first joint of each tarsus white scaled; tarsal claws simple. Wings hyaline, scales brown, narrow-lanceolate and linear intermixed. Length about 3 mm.

Trinidad, West Indies. A female collected by Mr. F. W. Urich. Type No. 9140, U. S. National Museum.

Melanoconion Urichii, n. sp.—Proboscis and palpi black scaled, occiput yellow scaled. Thorax thinly black scaled, the median part of the posterior half chiefly yellow scaled, the bristles on this part and on the scutellum yellow. Abdomen black scaled, the venter with a row of large violet spots on either side of segments from two to six, the middle of the venter golden-yellow scaled except on the narrow hind margins of the last four segments. Legs black scaled, with a purplish tinge, the under side of the femora, at least basally, yellow scaled, a large patch of violet scales before the apex of the front side of each femur, fourth joint of hind tarsi white scaled (the fifth is wanting); tarsal claws simple. Wings hyaline, somewhat smoky along the costa, the scales black; with a purplish tinge, those in outer half of wings rather broad, oblanceolate. Length about 4 mm.

Trinidad, West Indies. A female specimen collected by Mr. F. W. Urich, after whom this fine species is named. Type No. 9141, U. S. National Museum.

Verrallina insolita, n. sp.—Proboscis and palpi black scaled, occiput white scaled around the edge, yellow scaled in the centre, and with a pair of black scaled spots on the upper half. Thorax black scaled in the middle, the sides in front of the wings broadly, and spots on the pleura, white scaled. Abdomen black scaled, with a tinge of purple, middle of venter, except on the broad apices of the last four segments, white scaled. extending outwardly considerably on these segments. Legs black scaled, the under side of the front and middle femora towards the base, and the whole of the hind femora except the base and a broad band beyond the middle, white scaled; narrow bases of first three joints of the front and middle tarsi, both ends of the first joint and base of the second joint of the hind tarsi white scaled; claws of the front and middle tarsi toothed, those of the hind ones simple. Wings hyaline, the scales brown. Length nearly 4 mm.

Trinidad, West Indies. A female collected by Mr. F. W. Urich. Type No. 9142, U. S. National Museum.

A NEW LASIOCAMPID FROM ARIZONA.

BY WILLIAM BARNES, S. B., M. D., DECATUR, ILL.

Eutricha Oweni, n. sp., ♂.—Expanse, 70 mm. Thorax, abdomen and fore wings reddish-brown, more or less lightened from an admixture of pale gray or whitish scales or hairs. Fore wings crossed by four lines, one at inner fourth dark reddish-brown, accompanied by a pale inner line, almost transverse, only slightly incurved at costa and inner margin. The dark portion of the line is well marked, the paler portion not so distinct. The course of the line is slightly irregular, not perfectly smooth and even. The second line is just beyond the middle of the wing, it is similar to the first, only the pale shade is on the outer side. It is slightly exserted beyond cell, somewhat drawn in at the inner margin and a little wavy at costal end. The space between these two lines is somewhat darker than the rest of the wing. The third line is much fainter than the others, but is rendered more prominent by the contrast between the paler shade of the wing following and the slightly darker shade preceding it, which latter is, however, a trifle paler than the median space. The fourth or subterminal line is irregular and broken into short intravenular dots and bars,

which are of a darker colour than any of the other markings. The wing following this line is somewhat darker than the portion preceding it. The veins of about the outer half of the wings are paler than the interspaces. Outer margin slightly scalloped, fringe concolorous. Hind wings of uniform reddish-brown, darker than fore wings. Fringe whitish at extreme edge. Outer margin quite distinctly scalloped.

Beneath the fore wings are of about the same shade as the hind wings above, while the hind wings beneath almost match the fore wings above in colour. The fore wings are somewhat washed with gray towards apex and outer margin. A double outer line more or less in evidence, the inner of the two, on hind wings, being well marked, the outer one much fainter. On fore wings both lines are quite faint, though easily traceable. Antennæ brown, quite broadly bipectinate to tip.

♀. Expanse, 92 mm. Compared with the ♂, the wings are much more distinctly scalloped, the colour of head, thorax and fore wings, while still somewhat lighter than the hind wings, is not so much mixed with gray, and the pale band preceding the subterminal broken line is much more contrasting, being quite a little paler than the rest of the wing, while the median space is only a shade darker.

The relation of colours of the under side to the upper is the same as in the ♂, the hind wings, however, being only a trifle lighter than the fore. The transverse lines are less well marked, being scarcely traceable, except toward costa of fore wing.

Types ♂ and ♀. Southern Arizona, August 21st, Chiricahua Mts.

I take pleasure in naming this beautiful species after Mr. V. W. Owen, of Los Angeles, California, who kindly sent the specimens to me for description. It is congeneric with my *Coronada*, and from the evident resemblance to figures of various species of *Eutricha*, given in the Biol. Cent. Amer., there is no question but that they belong to that genus.

Halictus Pecosensis.—The type of this new species came from Pecos Canon, N. M., not from Pecos, as stated on page 6.

Mr. W. R. Dewar, a graduate of the Ontario Agricultural College, Guelph, has been appointed Entomologist of the Agricultural Department of Cape Colony, South Africa.

BOOK NOTICE.

THE BUTTERFLIES OF THE WEST COAST OF THE UNITED STATES.—By William Greenwood Wright. Price, postpaid, $4.35. Published by the author, 445 F. St., San Bernardino, California.

For a score of years Mr. Wright has been known to North American Lepidopterists as a keen and enthuiastic collector of butterflies, and now he has given to the world the results of his labours in the form of this large and handsome volume. It is profusely illustrated with 32 plates in colour photography, containing over 900 examples, and depicting all the species of butterflies, except the very commonest, that are found on the Pacific Coast. There is also a portrait of the author as a frontispiece, which forms a welcome addition to the book. One is struck at the first glance with the wealth of species that are unknown to us here, as for example in Parnassius, Anthocharis, Synchloe and Chionobas, and the abundance and variety in Pieris, Colias, Melitæa, Chrysophanus and other genera. For these plates and descriptions alone the book is well worth having, and anyone who exchanges with western collectors will find it most useful as well as delightful; to our friends in British Columbia it is surely indispensable.

The first part of the volume, some thirty pages, is taken up with "General features of Butterfly life," and contains the author's views on many points of interest, respecting some of which there is much diversity of opinion. There are also some good hints on collecting and preserving specimens. This is followed by a complete list of the butterflies of the United States, with localities, which will be found of much value. The body of the work consists of notes upon each species and variety taken in the "West Coast" region, giving the points of difference between varieties and disputed species, and descriptions of a number of new species. As a rule the figures on the plates are considered to be sufficient for identification without description, especially as the upper and under surfaces of both sexes are generally depicted. There are no doubt some instances where the author's conclusions will not be accepted by others, but we are not competent to offer any opinion upon them. A satisfactory decision can only be arrived at by those who have studied these butterflies in their native haunts and who have reared the varieties for more than one generation. We hope that the book will be in demand all over the Continent, and that the author may not suffer pecuniarily in his enterprise; certainly anyone who procures it cannot fail to be pleased, and it will form an admirable complement to Dr. Holland's "Butterfly Book."

Mailed February 5th, 1906.

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PRACTICAL AND POPULAR ENTOMOLOGY.—No. 11.

Household Insects.

BY WM. LOCHHEAD, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

Who is not interested in the insects that persist in living in our homes as unwelcome guests? Some of these intruders are blood-thirsty creatures, and torment the bodies of their helpless hosts; some confine their attentions to the carpets, woollens, and upholstery, and others are partial to the pantry, but all are heartily hated by the industrious housewife. In a short popular article such as this one, only brief notes will be given regarding the habits of some of the most important house insects, and only the best practical treatment will be indicated. The writer would refer those readers who desire to know more about these insects to the Reports of the Ontario Entomological Society, and to the Bulletins of the Bureau of Entomology at Washington.

For convenience of consideration, household insects may be grouped as follows:

1. Those molesting and annoying the inmates of the house: House-flies, Mosquitoes, Fleas, and Bed-bugs.

2. Those injuring the carpets, woollens and upholstery: Carpet-beetles and Clothes-moths.

3. Those feeding on food products in the pantry: Larder-beetles, Ham-mites, Cheese-skippers, Meal-worms, Flour-beetles and Flour-moths Cockroaches, and House-ants.

House-flies.—There are several species of these ubiquitous creatures. The common House-fly *(Musca domestica)* may annoy, but it never bites us. The Stable-fly *(Stomoxys calcitrans)* is a frequent visitor to our houses, more especially just before rain, and torments us by its sharp bites. Another species is the Blue-bottle or Blow-fly, but the House-fly is by far the most abundant form. The eggs of this species are deposited mainly on horse-manure about stables. A generation occupies from 10 to 14 days, depending on the temperature, the egg stage lasting about 24 hours, the larval or maggot stage from five to seven days, and the pupal stage from five to seven days. As each female lays over 100 eggs, it will

readily be seen how a few flies wintering over may give rise to millions of flies in late summer.

The prompt treatment of horse-manure with lime in special pits should be insisted upon in towns and cities, but where flies are abundant we must continue to use screens and sticky fly-paper to mitigate the annoyance.

Mosquitoes.—Here again, there are several species. The most common form is perhaps *Culex pungens*. The eggs are laid on the surface of the standing water of ponds, marshes and rain-barrels; the wrigglers escape from the eggs in about 24 hours, and transform to pupæ in 10 or 12 days, and the adult mosquitoes make their appearance two or three days after, a generation occupying, therefore, 14 to 16 days during warm weather. As in the case of the house fly, the winter is passed in the adult stage. It is now known that one species of mosquito is the cause of malaria and another of yellow-fever.

Careful attention to water-barrels and the drainage of ponds and marshes is absolutely necessary if freedom from mosquito attacks is desired. A little kerosene poured on stagnant water containing wrigglers will kill them.

Fleas.—The most common flea is the Cat- or Dog-flea (*Pulex serraticeps*) (Fig. 4). These are sometimes very abundant in rooms occupied by dogs and cats. The eggs are deposited loosely among the hairs of these animals, and often drop to the floor or matting, where the larvæ develop, especially if the mats are undisturbed and the floors are not swept. Liberal dusting of the infested animals and floors with pyrethrum insect powder, the renewal of the mats for the dogs, and the burning of the infested mats, will control fleas.

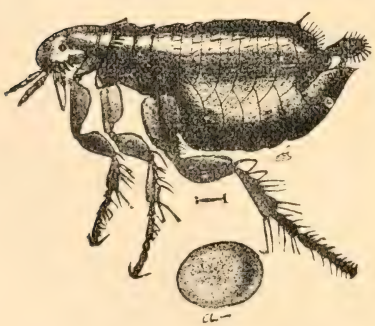

Fig. 4.—Flea and its egg, greatly magnified.

Bed-bugs.—These disgusting insects (*Cimex lectularia*) sometimes get into the houses of the most careful housekeepers, when travellers are entertained. The cheaper hotels in many parts of the west are often badly infested, and the bedrooms have a decided "buggy" odour. These festive insects hide in the daytime in the cracks of the furniture and walls,

but at night they are active. The eggs are white, and are laid in batches in cracks of the woodwork of the room.

Wooden beds should be discarded, and benzine should be carefully applied at intervals to all the crevices, small as well as large.

CARPET-BEETLES.—There are two species, the Buffalo Carpet-beetle *(Anthrenus scrophulariæ)* (Fig. 5) and the Black Carpet beetle *(Attagenus piceus)*. The former has become very abundant in many sections of the province, and considerable damage has been reported. The grub, or larva, does the harm, and is readily recognized by the stiff brown hairs that clothe the body. Its length is about one-quarter inch. Its habit is to cut long slits in the carpet, working along the cracks in the floor.

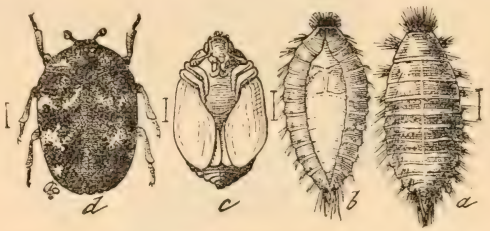

Fig. 5.—Buffalo Carpet-beetle, all stages, much magnified.

The adult is a small, rather pretty beetle, about one-fifth of an inch in length. The colour is black, mottled with red and white markings. Many of the adults appear in the fall, and pass the winter as adults, while others appear in the spring. In heated houses the beetles continue to appear throughout the winter. In spring thousands of the beetles may frequently be observed on the blossoms of Spiræas and many other plants; and no doubt many adults fly into houses from these plants through the open windows.

To rid an infested house of these beetles, it is necessary to take up the carpets, thoroughly beat them out of doors, and to spray them with benzine. The floors should be swept carefully, the cracks dusted out, sprayed with benzine, and filled up with putty or plaster of Paris. Since damage is done mainly along the borders of the rooms, the carpets should be examined from time to time. It is advisable to replace the carpets with rugs, as the latter are easily taken up and beaten.

The Black Carpet-beetle is frequently met with. The larva has a long tuft at the hind end of the body, and is readily distinguished from the Buffalo Carpet-beetle. The adult is a small, oval, black beetle, and has been often noted as a pest in museums and flour-mills, in addition to dwelling-houses.

The treatment recommended for the control of the Buffalo Carpet-beetle will answer for the Black Carpet-beetle.

CLOTHES-MOTHS.—There are three species that are more or less common, viz., the Case-bearing Clothes-moth *(Tinea pellionella)* (Fig. 6),

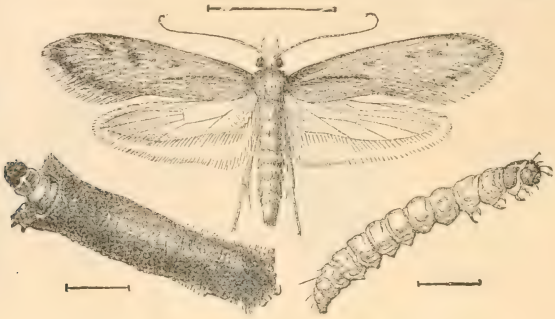

Fig. 6.—Case-bearing Clothes-moth, much magnified.

the Naked Clothes-moth *(Tinea biselliella)*, and the Tube-building Clothes-moth *(Tinea tapetzella)*. The habits of the larvæ of these three species are quite characteristic, and their English names, as given above, describe fairly well their mode of working.

The adults of Clothes-moths are tiny moths, not the large "millers" that fly into our houses in the summer.

As a rule, only those articles of wear are injured that are left undisturbed for a time. Consequently clothes that are hung away in closets should be taken out frequently and beaten and exposed to the air out of doors for a few hours. In the spring winter clothing, furs, blankets, etc., should be well brushed and aired, then stored away in paper bags or other suitable pest-proof boxes, care being taken to close tightly the mouths of the bags by the use of paste.

With upholstery it may be necessary occasionally to spray carefully with benzine, and to air for several hours.

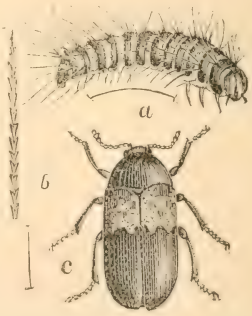

Fig. 7.—Larder-beetle—*a* grub; *b* hair; *c* beetle—all much magnified.

LARDER-BEETLES.—*(Dermestes lardarius)* (Fig. 7). These are dark-brown beetles, with a lighter band across the base of the wing-covers. The larvæ are dark,

hairy grubs, about one-third inch long. They are often found in museums, and sometimes overrun pantries and rooms containing meat, cheese and other animal products.

When a room becomes badly infested, it should be cleared of its contents, and thoroughly treated with either benzine spray or the fumes of carbon bisulphide, when there is no fire or light near. Occasional treatment in this way will keep the room practically free from these disagreeable beetles.

Cheese, Ham and Flour Mites.—There are two common species of mites infesting the pantry, viz.: *Tyroglyphus longior* and *Tyroglyphus siro*. (Fig. 8.) These pests breed very rapidly, and are especially fond of cheese. They can remain for months in a dormant condition as hard-shelled creatures, and under favourable conditions return to a state of activity. It is believed that it is while they are in this torpid state they are carried to new places and new food supplies.

Fig. 8.—Cheese-mite, greatly magnified.

Complete extermination of these mites is difficult, but if the infested room be thoroughly cleaned, and given a careful fumigation with sulphur or carbon bisulphide, little headway can be made by these creatures. Infested food products should be destroyed when first observed.

Flour-beetles, Flour-moths and Meal-worms.—Some Meal-worms are grubs of certain beetles, while others are caterpillars of certain moths. The most common forms are the Confused Flour-beetle (*Tribolium confusum*), the Yellow Meal-worm (*Tenebrio molitor*), the Meal Snout-moth (*Pyralis farinalis*), the Saw-toothed Grain-beetle (*Silvanus surinamensis*), and the Cadelle (*Tenebrioides mauritanicus*), the last two species being most destructive in stored grain.

The most effective treatment of flour and meal pests is fumigation with carbon bisulphide. Half a cupful poured into a saucer placed on the top of the flour will suffice for a barrel, if the whole is covered tightly and left for a day or two. It must be borne in mind, however, that it is dangerous to bring a light near the vapour of carbon bisulphide, and great care should be exercised.

Tiny Red Ants are frequently great nuisances about dwellings. They have "the faculty of getting into articles of food, particularly sugars, syrups, and other sweets" As they nest in the walls or beneath the flooring, it is sometimes difficult to eradicate them, but even inaccessible nests may be reached by the injection of carbon bisulphide. Sponges saturated with a sugar solution will attract ants by the dozens, and have been used successfully as traps. When full of ants the sponges are dropped into boiling water, and then replaced, and this done until the colony is exterminated.

ANOTHER GEOMETRID TANGLE.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

In a paper written not long since (Can. Ent., Vol. XXXVII., p. 344) I stated that in examining the type of Dr. Hulst's genus Talledega (*Lobophora montanata*, Pack.) the male was possessed of characters which would place it in the genus *Lobophora*, Curtis, and that in consequence the genus *Talledega* would fall. I did not know then that two species, belonging to different genera, were passing under the name of *montanata*, Pack., but such is the fact. *Montanata* was described by Dr. Packard in 1874 from specimens taken in Colorado, and he gives an excellent plate with his redescription of it in Mono. Geom., 1876, pl. 9, fig. 21. With these he mingled specimens from Amherst, Mass., Quebec and Montreal, Can., to which he refers at the close of his description thus: "The specimens from Quebec, and Amherst, Mass., differ from the Coloradean examples in being whiter, with less of a flesh-coloured tint, and with the lines less distinct on the hind wings." Now, this Eastern form, as he considered it, I take quite frequently in the Catskill Mts., and an examination of it led me to believe Dr. Hulst was in error when he defined the genus *Talledega*. This is not the case. *Talledega* stands with the true *montanata*, Pack., as its type, and the associated Eastern species goes into the genus *Lobophora*, Curtis. What species is it? I believe it to be the *inequaliata* of Packard, described and figured also (Mono. Geom., 1876, p. 180, pl. 9, fig. 20) from a single female, taken by Mr. H. K. Morrison on Long Island, and from that locality I also have one ♂ specimen. The plate is an excellent one of this form, but the type is lost so far as I can discover. It is not in the Packard coll. at Cambridge—but Dr. Hulst has decided that *inequaliata*, Pack., is synonymous with *nivigerata*, Walk., which, if correct, would make THIS species the *nivigerata*, Walk., and NOT the small species from California, one-third less in size and not

corresponding with either plate or description of *inequaliata*, now bearing the name of *Philopsia nivigerata*, so called by Dr. Hulst. I have not found any specimens of the latter taken outside California. Certainly it could not have been captured on Long Island, nor at St. Martin's Falls, Hudson's Bay Terr., whence Walker's type came. If I am correct in this (and only by comparison with Walker's type can this be proven) then our California species has never been named or described. If I am mistaken, then what I call *inequaliata* remains a good species in the genus *Lobophora*, Curtis.

Through the kindness of Dr. Wm. Barnes, who sent me his material in this group, I have been enabled to reach these premises and others. Among it were specimens of *T. montanata*, var. *magnoliatoidata*, Dyar, so labelled, I think by him, from Arrowhead Lake, Man. In describing it (Proc. U. S. Nat. Museum, Vol. XXVII., p. 889) he says: "It differs from the eastern *montanata* in the much darker colours, etc." Disassociated from the eastern form, which belongs to another genus, and placed with its real relatives from Colorado and California, these contrasts vanish, and, in my opinion, it does not represent even a geographical race. Specimens from Palo Alto, Cal., are darker in colour and the lines more distinct, but in this family such forms appear in every group, and if named at all, should represent a fixed variation, constant in some locality, due to climate or habitat. With these also were specimens of *Talledega tabulenta*, so labelled from Cartwright, Man. His type came from Alert Island, Alaska. These may constitute a good species, but I cannot separate them from our eastern *Lobophora*, of which I have 18 males and 6 females before me. In any event they belong to the genus *Lobophora*, the males having hair pencil on hind tibia. There is also a single ♀ from Victoria, B. C., which may be the Alaskan species. The Hulst type is in such poor condition its markings cannot be compared, but a male specimen is necessary to help settle that point. I would be glad to receive from collectors in Manitoba and B. C. any of this group in both sexes for further study, and I will not confiscate their material without consent. I hope they will second my endeavours to straighten out these complexities, and this is my excuse for presenting some theories now, instead of definite findings later.

It is not impossible that Walker's type of *nivigerata* may be conspecific with the Alaskan, Manitoban or British Columbian species. Who can tell?

(To be continued.)

GUELPH BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The fifth regular meeting of the Guelph Branch was held in the Agricultural College on Wednesday evening, January 10th, 1906, with 19 members and 3 visitors in attendance.

Mr. T. J. Moore gave a very interesting talk on the habits and life-histories of several species of Lepidoptera. He exhibited many very fine specimens in different stages of development.

Mr. D. Jones presented notes on several species of Caddice-flies taken at Guelph in the summer of 1905. One of the species was new to science, and will be described by Mr. Nathan Banks, of Washington.

Mr. G. E. Sanders presented notes on the Cotton moth (*Aletia argillacea*) taken at Guelph in the summer of 1905. It was found after four or five days of strong wind from the south. It has not been known to breed north of the Gulf States.

Mr. C. R. Klinck presented notes on some Pseudoscorpions he found last summer under a board in a poultry-house. These arachnids feed on small insects and mites.

Prof. Sherman announced to the club that the Kilman collection of beetles and other insects had been purchased by the College.

Mr. M. Baker discussed three greenhouse insects, viz.: White fly, Black aphis and Green aphis. Specimens in all stages of their life-history were exhibited under the microscope for examination by the members. Affected plants were also exhibited, and methods for combating the pests were briefly discussed.

The sixth regular meeting was held in the Agricultural College on Wednesday evening, Jan. 24th, with 17 members and two visitors in attendance.

Mr. J. R. Dickson discussed the 17-year Locust. He brought out very many interesting facts about its life-history and habits. This insect has not yet been recorded in Ontario, although quite common in New York and Michigan.

Mr. T. D. Jarvis presented notes on a species of Lecanium attacking the ironwood. This species is probably more abundant than any other in Ontario. Mr. H. A. Bond presented notes on the Two-spotted Lady-beetle. He found several specimens in the nest of a mud wasp.

A brief review of the current literature was given by Mr. B. Barlow.

T. D. Jarvis, Secretary.

TWO NEW SCALE-INSECTS.

BY R. S. WOGLUM, RALEIGH, N. C.

While making a study of the Coccidæ representing the genus Aspidiotus (*sens. latiss.*) in the collection of Cornell University, I found two undescribed species; both are from the United States. These species are characterized as follows:

Aspidiotus oxycoccus, n. sp. (Fig. 9.)

Scale.—The scale of the female is almost flat, and very variable in shape. It is usually circular, or nearly so, but may be elongate with sides parallel. The scales on the upper surface of the leaves are black; those on the under surface are dirty gray to dark brown, usually the lighter

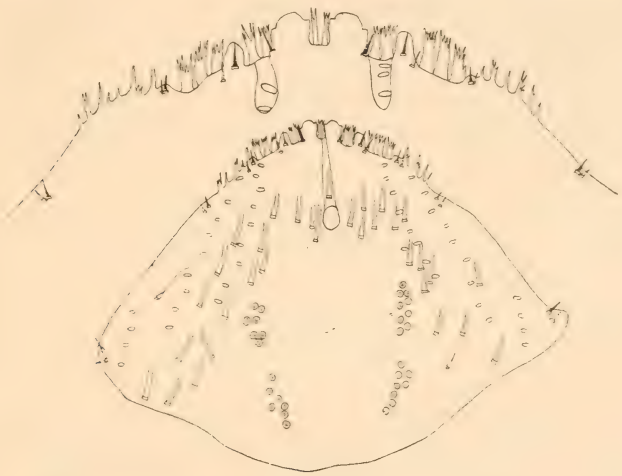

Fig. 9.—Aspidiotus oxycoccus—Pygidium and Anal Fringe.

colour. Exuviæ are central to sub-central. The younger scales have the exuviæ marked by a small brown or blackish nipple-shaped process, which often disappears in the older scales, leaving the yellowish-orange exuviæ exposed. The secretion covering the remainder of the exuviæ is of a dirty gray colour, and usually presents a marked contrast to that part of the scale immediately surrounding it. The scale of the male is similar to that of the female in size and colour. It is elongate with sides parallel.

Female.—The female is dull brown, broadly pyriform, about .47 mm. broad by .57 mm. long. The *pygidium* is furnished with two pairs of lobes.

The mesal lobes are the largest, and are parallel, widely separated, broadly notched once on both outer and inner sides, with ends rounded, and slightly narrowed at the base, 10–12 μ broad by 12–14 μ long. The lobes of the second pair are small, entire or slightly notched on outer side. *Incisions* are wanting. The *plates* are slightly shorter than the mesal lobes, and are situated as follows: Two between mesal lobes, two between first and second lobes, 6–8 laterad of second lobe. The interlobular plates and the first three laterad of the second lobe are deeply and similarly branched; the remainder are simple or irregularly branched. The *spines* are small, shorter than the lobes. On the dorsal surface they are situated as follows: One at the outer part of the base of the mesal lobes, one at the base of the second lobe, one just beyond third plate laterad of second lobe, one just beyond fringe, and one at the anterior margin of the pygidium. Spines on the ventral surface are similarly situated; wanting at the mesal lobes.

The *spinnerets* are in four groups; anterior laterals 9–12, posterior laterals 6–8. The *anus* is midway between the mesal lobes and the

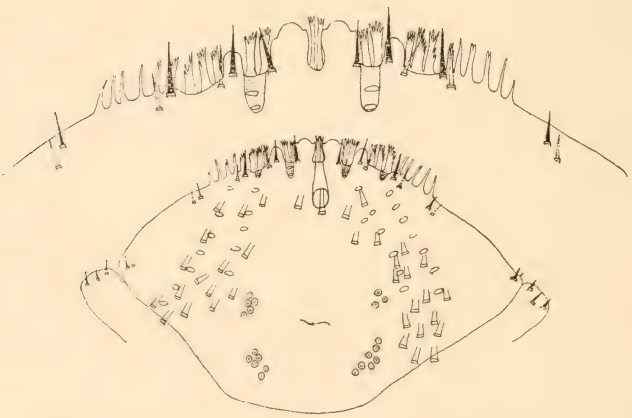

Fig. 10.—Aspidiotus pseudospinosus—Pygidium and Anal Fringe.

posterior lateral spinnerets, or about 50 μ from the mesal lobes. The *vaginal opening* is between the posterior lateral spinnerets. The *pores* are in three rows on either side of pygidium. *Dorsal tubular spinnerets* are numerous, elongated, about 15–20 on either side of pygidium. The body of the insect is fringed at the sides with small spines.

Habitat.—On Cranberry. Collected by J. B. Smith in 1891.

Aspidiotus pseudospinosus, n. sp. (Fig. 10)

Scale.—The scale of the female is circular, or somewhat oval, slightly convex, 1.5–2 mm. in diameter; covered by a brown fungus.

Female.—The female is brownish-yellow, nearly circular, about .58 mm. broad by .6 mm. long. The *pygidium* is furnished with two pairs of lobes. The mesal lobes are large, widely separated (5–6 μ), parallel, distinctly notched on both outer and inner sides, rounded at end, about 12–14 μ broad by 12–13 μ long. Lobes of the second pair are much smaller than the mesal lobes, entire or slightly notched on outer side. *Incisions* are wanting. *Plates* are well developed They are situated as follows: Two between the mesal lobes, two between the first and second lobes, and six to ten laterad of the second lobe. The interlobular plates and the first three laterad of the second lobe are branched; the remainder are simple, unbranched. *Spines* are large. On the dorsal surface they are situated as follows: One at the outer side of the base of the mesal lobe, one at the base of the second lobe, one just beyond the third plate laterad of the second lobe, one just beyond the last plate, and one at the anterior border of the pygidium. The first three spines are as long as or longer than the plates. Spines on the ventral surface are similarly situated; wanting at the mesal lobes. *Spinnerets* are in four groups; anterior laterals 5–7, posterior laterals 3–6. The *anus* is large, and situated at the caudal end of the pygidium, about 28–33 μ from base of mesal lobes. The *vaginal opening* is between anterior and posterior lateral groups of spinnerets. The *pores* are large, in two rows on each side of pygidium; 6–10 pores in each row. *Dorsal tubular spinnerets* are present, short, irregular, or seldom in two rows on each side, about 15–20 on each side.

This species is closely related to *A. spinosus*, Comst., from which it differs mainly by the presence of dorsal tubular spinnerets. The mesal lobes are not prolonged inward as in *spinosus*, and are more widely separated (2–3 μ in *spinosus*). The plates also differ.

Habitat.—The specimens were taken from Saw Palmetto, collected in Florida by W. H. Field in 1882, and since have been in the collection of the Entomological Department of Cornell University.

Types of the two above described species are in the Entomological Department of Cornell University, and the U. S National Museum.

NEW LEPIDOPTERA.

BY ANDREW GRAY WEEKS, JR., BOSTON.

Adelpha Oronoco, sp., nov.

Habitat: Suapure, Venezuela. Expanse, 1.60 inches.

Head and thorax dark brown above, with a slight white dot at base of each antenna; below nearly white. Palpi black above, white below. Abdomen dark brown above, below nearly white, with a dusting of tawny scales on the last two segments. Antennæ dark brown.

The upper side of both wings has the black linings or threads, the brown ground colour, and tawny markings so prevalent in many species of this genus.

Upper side of fore wing rich brown. Hind margin slightly dentated. From the centre of costa a broad tawny band extends downwards to centre of inner margin parallel to hind margin. This band is the prominent feature of the upper surface. The portion of this band in the interspace at the end of the discoidal space suffuses outwards a sixteenth inch towards hind margin. Above the end of this, in apical area, are two tawny spots. These spots might be considered a portion of the band but broken from it by an area of the ground colour. The basal half of the wing, within the tawny band, is rich brown excepting four black lines which cross the discoidal space in pairs, and a slight dash of black close to base. This dash is repeated in less degree in the next lower interspace. The pair of black lines next beyond this dash enclose a small space of dark tawny; these lines are repeated in the first submedian interspace.

The upper side of lower wing is of the same ground colour, crossed by a very prominent band of white, an extension of the tawny band of the fore wing, and tapering somewhat as it approaches anal angle. The outer edge of this band at its upper portion is lightly dusted with tawny scales. The marginal area outside of this band is rich brown, crossed by three bands or lines of black, parallel to one another and following the dentated contour of the hind margin. They join at the anal angle, where there is a prominent tawny spot. The inner marginal area is of the ground colour.

On the under side of fore wing the tawny band of upper surface is nearly white, with suffusions of tawny. The discoidal space is white, crossed by two heavy bands of tawny, edged with black. The costa is tawny. Subcostal space near base is white. The hind margin is slightly edged with black, within which is a tawny marginal band, becoming white in the two lower interspaces. Within this, at the apex, are two indistinct

whitish spots, one below the other, and there are three more prominent white spots in the three lower interspaces. At the apex, nearer the base than these two whitish spots, are two more larger ones, representing the two tawny spots of the upper surface. The general ground colour is blackish, with tawny suffusions.

The markings of under side of hind wing are the same in location and limitation as on the upper surface. The general colouring, however, is much lighter. The white band of upper surface is repeated, showing no suffusion from surrounding areas. Nearer the base is a tawny band running from costa to anal angle. This band is edged with black. Nearer the base is a white band which runs from costa downwards along inner margin, edged with tawny black. The hind marginal area is brown, with a double row of interspacial white lines near the margin, and a band of tawny, edged with black on its basal side, extends from upper angle to anal angle, where it meets the tawny band first mentioned. At their junction they broaden somewhat into a bright tawny anal spot.

This species is in the same group as, and resembles closely, *A. æthalia*, Feld., and *A. thesprotia*, Feld.

Mesene Rochesteri, sp. nov.

Habitat: Suapure, Venezuela. Expanse, .90 inch.

Head black. Antennæ black, with minute white annulations at base of each joint. Club black, with orange tip. Thorax black above, with orange hairs; beneath grayish. Abdomen orange above, beneath grayish. Legs orange above, beneath grayish.

Upper side of fore wing orange. Hind margin, apical area and costa black. This black border is nearly one quarter inch broad, covering more than half the wing area.

Upper side of hind wing orange of same shade as fore wing. The hind margin has a broad black border, the same width as on fore wing. Costa and inner margin are orange.

Under side of fore wing the same as upper surface.

Under side of hind wing the same as upper surface, except that the black border contains two white spots, one near the anal angle, the other midway to upper angle.

Variations.—In the ten specimens in my collection, there is scarcely any variation in the width or density of the black border. In some specimens the fore wing has a white spot at the inner edge of the hind marginal black border midway from apex to lower angle. The two white

spots on under side of hind wing sometimes show on the upper surface. There is also a third spot between them. It is quite probable that in a large series of specimens these white spots would vary in number and development.

It bears a close resemblance to *M. celetes*, Bates, the black border being, however, much broader.

Nymphidium Blakei, sp. nov.

Habitat: Suapure, Venezuela. Expanse, 1.00 inch.

Head, thorax and abdomen above black, beneath white. Antennæ black, with white annulations at base of each joint. Club black above, white beneath. Legs white.

Fore wing above white, excepting costa, apex and hind margin. Costa black. Apical area black. Hind margin black, with a white thread just within the margin. Within this thread is a series of interspacial semicircles of white, which, with the white marginal thread, gives the appearance of a series of interspacial white circles extending from apex to lower angle. At the extreme edge of the hind margin, just below the apex, is a white dot, and another opposite the end of the first submedian interspace.

Upper side of hind wing the same as fore wing, except that the costa is white, and the two hind marginal spots are absent.

The black hind marginal border of both wings, and the black costal border of fore wing, are one-sixteenth inch wide.

Under side of fore wing is the same as upper surface, except that the two hind marginal white spots are more prominent, and there is a third one at the end of the lowest submedian interspace.

The under side of hind wing is the same as upper surface, except that the three hind marginal spots of the under side of fore wing are repeated.

This species is not in the larger collections of this country, nor in the British Museum.

Taken in September, 1899.

Ithomia Drogheda, sp. nov.

Habitat: Suapure, Venezuela. Expanse, 2.50 inches.

Head black, with a white circle around the eyes. Antennæ black. Club tawny. Thorax above black, with a prominent lemon-yellow spot at the junction with the costa of fore wings; beneath lemon-yellow.

Abdomen nearly black above, with four lemon-yellow dots on the lower segments ; beneath lemon-yellow. Legs black above, white beneath.

Upper side of fore wing transparent, with tawny, black and yellow markings. Costa black. Discoidal space transparent, with dusting of tawny scales towards the base, and a suggestion of a black spot near the centre. A heavy dusting of black scales extends from the costa downwards across the end of the discoidal space, suffusing to hind margin along the median nervure, and also along the first submedian nervule, somewhat tawny near the margin. Apical area black. Between the apical area and the band or dusting of black scales above noted, the space is transparent, heavily dusted with brown scales near the costa. The space below median nervure to the hind margin is black, with tawny scales along the nervure.

The upper side of hind wing has the same ground colouring. The upper half of the wing, including the discoidal space and its immediate surroundings, is transparent, the nervures and nervules being heavily dusted with lemon-yellow. The edges of this transparent area are black, the lower portion forming a band across the wing from the centre of inner margin nearly to the upper angle. This transparent area shows a tendency to extend downwards to hind margin in the first submedian interspace. Below this the area to hind margin is tawny. The hind margin has a generous black border, wavy on its basal edge.

The under side of both wings is the same as upper surfaces, the dusting of lemon-yellow scales being more marked. At the apex of the fore wing are four interspacial white spots, and in the black border of the hind margin of the lower wing is a series of prominent interspacial white spots.

Variations.—This species varies greatly in the density and suffusions of its markings. The transparent area of the lower wing in some specimens extends downwards to hind margin, cutting off the black band and the tawny area at the first submedian nervule. The white spots at apex of the under side of fore wing are at times entirely wanting.

Euselasia Howlandi, sp. nov.

Habitat : Suapure, Venezuela. Expanse, 1.12 inches.

Head and abdomen mouse colour. Palpi white. Thorax mouse colour above, with a few lighter hairs ; beneath gray. Antennæ mouse

colour, with minute white annulations at base of each joint. Club mouse colour, tipped with brown. Legs tawny.

Upper side of fore wing mouse colour, excepting an area within a line drawn from base along median nervure to a point one quarter inch from hind margin, thence downward to inner margin, parallel to hind margin. This area, covering one-third of the total wing area, is light gray, dusted with darker scales near the base. The hind margin has a slight mouse-coloured fringe, becoming white near lower angle.

Upper side of hind wing dark mouse colour, the central area very slightly lighter. Hind margin dentated, and with a white fringe. Along the edge is a dark line slightly touched with tawny on basal side, lower margin grayish white.

Under side of fore wing very light gray, with tawny markings. A prominent tawny line runs from costa downwards across the centre of the discoidal space to the junction of the lower submedian nervule, somewhat concaved, thence straight to inner margin. Beyond this line, nearer apex, is a similar line running from costa downwards across the end of the discoidal space nearly to inner margin. A third line runs from costa to inner margin one-sixteenth inch from hind margin. The interspaces between this line and the line next nearer the base are heavily dashed with tawny, from a line of spots from the costa downward. The central spot of this series, in interspace above the second submedian nervule, is nearly absent. The margin is lined with tawny, the space to the first marginal line being somewhat darker, and dashed with white scales in the interspaces.

Under side of hind wing very nearly duplicates the under side of fore wing in general appearance. The tawny line first above noted in fore wing is continued, starting on the costa near its base, and running downwards across the centre of the discoidal space, and then disappearing. The next tawny line runs downwards from the costa across the end of the discoidal space to the first submedian nervule, where it turns at a right angle and runs to the inner margin. This line is somewhat dentated in the interspaces. The area outside of this, to the marginal line, is very light gray, with a series of interspacial tawny dustings, a continuance of the same in fore wing. The hind margin has a white fringe, within which is a tawny line, and within that a fine, well-developed black thread, following the dentated contour of the margin.

TRICHOGRAMMA PRETIOSA, RILEY: COLOUR VARIATION IN THE ADULT, WITH DESCRIPTION OF A NEW VARIETY.

BY A. ARSENE GIRAULT, WASHINGTON, D. C.

In the original description of this insect,* Dr. Riley says that on account of its uniform pale yellow colour it is easily distinguished from *Trichogramma minutum*, Riley, which is black. Unfortunately, this does not hold.† Out of the hundreds of specimens of *pretiosa* reared during the entire season of 1904, at Paris, Texas, from the eggs of *Heliothis obsoleta*, Fabricius, there appeared from a lot of host eggs on Sept. 20th a number of dark individuals, which could easily have been mistaken for a distinct species. Previous to this, all of the individuals had been normally coloured.

The origin and subsequent history of this variety is as follows:

On the 10th, 11th and 12th of September a generation of 11 males and 22 females, all normally coloured, emerged in confinement from the host eggs on tomato leaves brought in from the field. Sixty-four eggs from moths in confinement were then supplied them on Sept. 11th, and freely parasitized. As a result, there emerged from these parasitized eggs a second generation of 53 males and 58 females, plus 11.

This second generation varied considerably, some of the individuals were very dark, others wholly black. The variation consisted in very light brown to a deep black, and gradations were present from one to the other. In the latter, the black first appeared in the abdomen, and as the variation became greater extended to the thorax and head, until the whole body became black. In this generation the variety was present in the proportion of 1 to 7. Both the typical specimens and the variety were freely copulating with each other.

The adults of this second generation were supplied with 48 fertile host eggs from moths kept in confinement, on Sept. 21st. Oviposition took place, and as a result a third generation began to appear on Sept. 30th. This generation consisted of 47 adults, of which 7 males and 7 females were the black variety.

*CANADIAN ENT., 1879, XI., pp. 161-162.

†Dyar, 1893, CANADIAN ENT., XXV., p. 256, mentioned that the males of *pretiosa* are often black on the dorsum of the abdomen.

In turn, the third generation was allowed to parasitize numerous hosts from moths in confinement during the 1st of October. As formerly, the dark and light specimens were intermating. The resulting fourth generation emerged on Oct. 14th, consisting of 25 specimens, including 5 males and 7 females of the black variety.

Eight males and 16 females of the fourth generation parasitized on Oct. 14th hosts from the field. The resulting fifth successive generation began to appear on Nov. 2nd, when a single specimen emerged. Others emerged at intervals up to Nov. 15th. There were 4 females, 3 males, plus 7, all the dark variety. Three females and two of the males were totally black, one male dark, and the remaining specimens were dusky.

A supplementary fifth generation was obtained from a single black female of the fourth generation, which parasitized five hosts on Oct. 14th.

The 9 descendants of this black variety were all black; there were 5 males and 4 females. They appeared on Nov. 7, and later.

Because of the lateness of the season, the parasites began to hibernate, and the work was discontinued. As it became colder the proportion of black individuals increased.

During October and early November *pretiosa* reared from hosts collected from the leaves of corn, included many dark specimens. In fact, the majority were moderately dark, a few entirely black, while many were gradations, having the abdomen only black. Three specimens issuing on Nov. 4th from a single host egg from the field, were similar in colour, the head and thorax yellow, the abdomen black. Thus the variation was not confined to the individuals kept in confinement. It appeared to be quite general. The variety may be named as follows :

Trichogramma pretiosa, Riley, var. *nigra*, n. var.

Like the type. The whole body uniformly black, excepting the antennæ, eyes, legs and wings. Gradating specimens of all degrees present.

From many males and females reared from the eggs of *Heliothis obsoleta*, Fabricius, at Paris, Texas, during September, October, and early November, 1904, in connection with the Cotton Bollworm Investigations, Bureau of Entomology, U. S. Department of Agriculture. Preserved specimens in balsam, therefore no type.

THE COCCID GENUS EULECANIUM.

BY T. D. A. COCKERELL, BOULDER, COLO.

Some years ago I attempted to make tables to separate the species of *Eulecanium*. The attempt was not wholly successful; partly on account of the difficulty of the subject, and partly because there are no doubt more names than species in this genus, and the first step should probably be to reduce a number to the synonymy. Certain characters of undoubted value could not be used because they were not known for many species; for example, the characters derived from the males and the larvæ. The minute characters described by Mr. Thro, of Cornell University, are in the same case; but their value is rather uncertain for closely-allied forms. The forms separated by Mr. Thro were nearly all widely separated otherwise—in fact, of different genera as we now understand them—and hence it remains to apply his test to a more difficult and closely-allied series.

The tables are presented herewith, not because they are perfectly safe guides to the identity of the species, but rather because of their value as indicating groupings, and suggesting the lines of future work. They will at any rate save some trouble in going through descriptions. When a name occurs twice, the species is variable.

(1.) Long. 10–11½, lat. 6–9½ mm.

(a) Larger as a rule, dark red-brown, with white powder; antennæ 7-jointed ..... *caryæ.*

(b) Not over 10 mm. long; brown, sometimes varied with yellow; antennæ 6-jointed ..... *aceris.*

(2.) Long. 8–9 mm.

(a) Convex; antennæ 6-jointed.

(i) Legs rather slender ..... *pyri.*

(ii) Legs short and robust; scale reddish-brown, sometimes mottled with yellow (*pyri* is darker and not mottled).

(b) Tibia equal to tarsus, fide Signoret ..... *aceris.*

(bb) Tibia longer ..... *capreæ.*

(*aceris* and *capreæ* are no doubt one species.)

The distinction of *pyri* and *aceris* is further confirmed by the males:

(i) ♂ yellow, with wide brownish thoracic band ..... *pyri.*

(ii) ♂ light reddish-brown, with darker band on thorax; abdomen, antennæ and legs yellowish ..... *aceris.*

(aa) Less convex; antennæ 7- or 8-jointed.

(i) Scale with two prominent tubercles; antennæ 8-jointed ..... *Cockerelli.*

(ii) Scale without such tubercles.

(b) Antennæ 7-jointed; scale alt. 2½–3 mm ... *mori.*

(bb) Antennæ 8-jointed.

(c) Joints 3, 4, 5 nearly equal ..... *genistæ.*

(cc) Joint 3 longer than 4, and this longer than 5.

(d) 5, 6, 7 nearly equal; scale narrower, 3 mm. wide; second antennal joint with one hair only, this very long ..... *elongatum.*

(dd) 6 longer than 7, and may be longer than 5; scale broader, 4½ mm. wide; second antennal joint with two long hairs .... *magnoliarum.*

(3.) Long. 7 mm.

(a) Convex, alt. usually 5 or 6 mm.

(i) Antennæ 8-jointed; legs short and robust, tarsus longer than tibia ..... *Douglasi.*

(ii) Antennæ 7-jointed; tarsus shorter than tibia.

(b) Legs long and slender ..... *coryli.*

(bb) Legs robust; scale higher, alt. 5 mm ..... *ulmi.*

(iii) Antennæ 6-jointed; legs robust, tarsus shorter than tibia; scale highest of this group; alt. 6 mm ..... *capreæ.*

(*ulmi* and *capreæ* are probably one species.)

(aa) Less convex, alt. not over 4 mm., usually less.

(i) Antennæ 8-jointed.

(b) Not pruinose; legs ordinary ..... *rosarum.*

(bb) Pruinose; anterior legs with tarsi very broad ..... *berberidis.*

(ii) Antennæ 7-jointed, joints 3 and 4 about equal; legs ordinary

(b) Pruinose with a whitish powder ..... *pruinosum.*

(bb) Not pruinose.

(c) More convex, 4 mm. high ..... *quercifex.*

(cc) Less convex, not over 3 mm. high ... *mori.*

(4.) Long. 6–6½ mm.

(a) Convex, alt. 4 to 6 mm.

(i) Antennæ 6-jointed.

(b) Legs slender; ♂ abdomen as wide as thorax ..... *tiliæ.*

(bb) Legs robust; tibia longer than tarsus.

(c) Scale finely punctured; alt. 6 mm., the highest of this group ..... *capreæ.*

(cc) Scale strongly punctured on the sides; alt. 4 mm.; ♂ abdomen hardly half as wide as thorax ..... *æsculi.*

(ii) Antennæ 7 jointed; scale not pruinose; legs ordinary.

(b) Scale hemispherical; legs rather slender .. *robiniæ.*

(bb) Scale with the anterior part very convex, the posterior depressed ..... *takachihoi.*

(aa) Less convex, alt. 3 mm. or less.

(i) Antennæ 8-jointed; European.

(b) Anterior legs with very broad tarsi .... *berberidis.*

(bb) Legs ordinary ..... *rosarum.*

(ii) Antennæ 7-jointed; Canadian.

(b) Third joint very long; scale alt. 2–3 mm ..... *caryarum.*

(bb) Third joint not especially long; scale alt. 2 mm ..... *fraxini.*

(iii) Antennæ 6-jointed; France ..... *ciliatum*, var.

(5.) Long. 5–5½ mm.

(a) Flattened form.

(i) Antennæ 6-jointed ..... *Kansasense* (alt. 2 mm.) and [*Folsomi* (alt. 1½ mm.).

(ii) Antennæ 7-jointed ... *Lintneri, assimile* and *aurantiacum.*

(iii) Antennæ 8-jointed ..... *hortensiæ, berberidis* and *persicæ.*

(aa) Less flat, alt. 2 to 3 mm ..... *Guignardi, ciliatum* and [*distinguendum.*

(aaa) Convex to subglobular ..... *Hoferi, antennatum, quercitronis,* [*bituberculatum, caryarum, corni, cynosbati, pyri,* [*robiniæ, robiniarum, rubi, rugosum, Canadense.*

(6.) Long. 4–4 + mm.

(a) Very convex .... *quercitronis, gibber, prunastri, robiniæ, Cana-*
[*dense, variegatum, perornatum.*

(aa) Less convex ..... *Guignardi, rosæ, Marchali, maculurarum,*
[*cerasi, robiniarum, rugosum, tarsale.*

(aaa) Flattish..... *Lustneri, Lymani, rufulum, assimile, aurantia-*
[*cum, Kansasense, armeniacum, Folsomi.*

(7.) Long. 3–3 + mm.

(a) Convex ..... *quercitronis, prunastri.*

(aa) Less convex..... *rufulum, pallidior, aurantiacum, Kansasense.*
[*Lymani.*

(aaa) Flattened..... *wistariæ.*

(8.) Long. 2–2 + mm..... *prunastri, Fletcheri.*

The following supplementary tables are based on the antennæ ; the measurements are all in μ :

Antennæ 6-jointed ..... 1.

Antennæ 7-jointed ..... 7.

Antennæ 8-jointed ..... 18.

1. Joints 3 and 4 equal, 6 as long or nearly so ..... *Lustneri*, King (cf.
[Reh., Zeit. f. Ent., 1903, p. 409).

Joint 3 always longest, and *very* much longer than 2, 4 or 5 ..... 2.

2. Joint 6 long, not very much shorter than 3... *rufulum* and *pallidior*.

Joint 6 very much shorter than 3..... 3.

3. 2 shorter than 4 or 5, 6 not much shorter than 5..... *Hoferi* (King).

2 about equal to 4 or 5 (compare also *corni*) ..... 4.

2 longer than 4 or 5..... 5.

4. 6 shorter than 4, which is longer than 2 or 5.. *quercifex* var. (Mass.).

6 much longer than 4 or 5, which are equal..... *Websteri*, var. on
[*Cytisus*, from Hamburg (fide King).

6 longer than 4 or 5, 5 longer than 4.... some Kansas *armeniacum.*

5. Joint 5 obviously longer than 4.... *Lymani* (on oak), *Canadense* (on
[elm), *prunastri* and *armeniacum.*

4 and 5 equal or almost so ..... *tarsale* (Mass., on *Cornus*),
[*rosæ* (on rose), sp. (Germany, on *Prunus*), *Folsomi*
[(on pawpaw), *capreæ* (of Douglas), *nigrofasciatum.*

5 shorter than 4..... 6.

6. Scale with a broad central boss.....*ciliatum* (France), *Kansasense* [(Kansas).
(The legs are larger in *ciliatum* than in *Kansasense.*)
Scale without such a boss.....*Websteri* (Ohio), *Kingii.*

7. Joint 3 longest, very long, *much* longer than 4.....8.
3 longest, but not very long, a little longer than 7; 6 shortest, 4 shorter than 2 .....*rosarum* of King and Reh.
1 longest, 2 and 3 nearly as long, or 3 shorter; 4 conspicuously shorter than 3; 5 a little longer than 4 or 6.....*perornatum*
4 conspicuously the longest; 5 shorter than 3..... .14.
4 longer than 3, but not greatly so, or equal with 3..... ..15.
3 longer than 4, but not greatly so, or equal with 4.....17.

8. Joint 4 much longer than 5; 5 and 6 shortest and equal.....*Canadense* (Maine, on elm), *caryæ* (cf. King).
4, 5, 6 short and equal or subequal (of *capreæ* and *ciliatum*).....9.

9. Joint 7 short, about as long as 4 or 5; 6 a little shorter than 5 or 7..... ..*Marchali.*
7 plainly longer than 4, 5 or 6..... .....10.

10. 6 shorter than 5 (of *antennatum*)..... 11.
5 and 6 equal, or 6 a trifle longest.....12.

11. 3 over 85 μ ....*rufulum.*
3 under 75 μ .....supposed *robiniæ* from Phœnix, Ariz., on [osage orange.

12. 3 about 80 μ.....supposed *robiniæ* from Phœnix, Ariz., on *Schinus* [*molle*; sp. incert. from Springfield, Mass., on *Quercus* (cf. King.)
3 90 to 110 μ.....13.

13 Joint 2 30 to 35 μ ..... *maclurarum.*
Joint 2 40 to 50 μ..... .....*caryarum.*

14. 5 and 6 equal..... ..*bituberculatum* from Stuttgart (cf. King).
5 longer than 6..... ..*bituberculatum* from Oregon.
6 longer than 5 ..... *prunastri.*

15. 2 longer than 3, 7 as long as 4.....*robiniarum* (original figure).
2 shorter than 3..... .....16.

16. European..... .....*assimile*, *variegatum*, *Rehi.*
American .....*tarsale* (Mass.), *kermoides* (Las Vegas Hot Springs, [N. M.), sp. on rose from Ohio, *Guignardi*,
[*Fitchii*, *armeniacum* (California).

17. Joint 5 longer than 6. ....*cynosbati, rosæ, aurantiacum, quercifex,* [*fraxini.*
5 and 6 equal, or 6 longer....*armeniacum* (Calif. and Kans.), *coryli* [of King and Reh, *Lymani, persicæ?* (Canada, under [glass, and from Dr. Reh, cf. King, *pruinosum,* [*quercitronis* (Ariz. and Calif.), *vini* of King and [Reh, *robiniæ?* (Tempe, Ariz., on osage-orange), [*quercifex* (of Signoret), *takachihoi* (Japan), *Cána-* [*dense* (Maine, on elm), sp. on tulip tree, R. I.

18. Joint 3 conspicuously longest, 5 conspicuously shorter than 4 or 6, 7 shortest of all; 8, 5 and 2 about the same length..*magnoliarum.*
3 longest, but not long, 5 and 8 about equal, and not much shorter than 3, 4 conspicuously shorter than 3 or 5....*prunastri* (France).
3 and 4 subequal, or sometimes 3, sometimes 4, a little the longer..19.
4 longest, much longer than 3, 3 and 5 about equal..... *hortensiæ.*
3 longest, and rather long, 4 conspicuously longer than 5; 5 being conspicuously shorter than 4, but a little longer than 6.....20.
3 longest, 4 and 5 equal or subequal .....21.

19. 5, 6 and 7 shortest, and equal or almost .....*subsimile* (Chihuahua) and *berberidis.*
6 and 7 shortest and equal, but 5 conspicuously longer....*hortensiæ.*

20. 8 short, shorter than 4, 7 a little shorter than 6.....*quercifex.*
8 longer, longer than 4, 7 a little longer than 6.....*persicæ?* (Canada, on peach under glass, cf. King).

21. 3 very long, much longer than any other joint.....22.
3 not very long, usually quite short; 4 shorter than 5 .. ..*Cockerelli, rosarum* of King and Reh, *Marchali.*

22. Joints 4, 5, 6, about equal .....*rufulum.*
5 longer than 4 or 6 .....*Cockerelli.*

The occurrence of the same species in several different places in the above table shows the great variability of the antennæ of these insects; yet I do not believe for a moment that this variability is indiscriminate, or that the antennæ are useless for purposes of identification. They must, however, be used cautiously in this genus, and in conjunction with other characters.

I do not expect to pay much more attention to this genus myself; for Mr. J. A. Sanders, with much better opportunities than I possess, is about to begin an investigation of it; and he will undoubtedly make many things clear which have been obscure.

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W.T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALBERTA.

(Continued from page 54.)

GEOMETRIDÆ.

[NOTE.—The generic names are as used by Rev. G. W. Taylor.]

452. *Rachela Bruceata*, Hulst.—Not observed previous to 1898. It appeared in millions in 1902, and in the following year was still more abundant. In those two years hundreds of acres of *Populus tremuloides* were completely denuded by the larvæ during June. It appeared to be aided in its depredations by a Tortrix, the name of which I have not yet discovered, but subsequent observation brings me to believe that by far the greater part of the denudation was caused by this species. I rarely saw more than eight or ten acres cleared in one patch, usually much less, but its ravages extended over a large tract of country, some twenty square miles, between Fish and Sheep Creeks. Beyond that I did not travel where there were poplars in any quantity. Salix was also attacked, but not so vigorously. The moths appeared in early October, and the apterous females could be found in numbers hanging with the males on the leafless twigs of poplars after dark. The males flew freely in the daytime, but in far greater numbers at dusk. Both the Rev. G.W.Taylor and Dr. Fletcher have seen the species.

453. *Talledega montanata*, Pack.—Two ♂ ♂ and a ♀. June 23rd to 28th, 1898 and 1904. Occurs at both the Billing's Mill locality and on Pine Creek.

454. *Eupithecia* (*Tephroclystis*) *Regina*, Taylor (MSS.)—Fairly common some years, flying at dusk. End June and July.

455. *E. borealis*, Hulst?—Mr. Taylor has a specimen from me, dated July 21st, 1901, on which he comments: "A prairie species, and in Mr. Hanham's collection from Winnipeg, bearing Hulst's label *borealis*, but does not agree with the description." I am not aware that I have taken another specimen of the same species.

456. *E. Casloata*, Dyar (Proc. U. S. Nat. Mus., XXVII., 891).—Described from two specimens taken at Kaslo. Eight specimens are at present in my series, and I fancy the species is not altogether rare here. July to middle of August.

457. *E. nimbicolor*, Hulst.—Described from here. The description says, "wings very uniform, blackish-fuscous, blackish cross-lines very faintly showing." Though I cannot, with certainty, trace back the specimen or specimens from which Hulst described the species, a careful process of elimination turns the probability upon one of two specimens, upon which he commented in a letter to me, dated June 14th, 1895: "They are probably *miserulata*, Grt., but the lines are very indistinct." One of these specimens was returned to me at that time. It is badly worn and greasy, but does not misfit the description. It is labelled "Mouth of Fish Creek, June 3rd, 1894." Mr. Taylor has seen it, and has two others from here of the same species, dated May 27th and June 3rd. He feels confident that they are the *nimbicolor* of Hulst, and writes me: "The species is well marked, and I do not know of any other with which it can be confused." Hulst mentions no data as attached to the type.

458. *E. multistrigata*, Hulst.—Mr. Taylor says: "This is *multistrigata*, without much doubt. Dr. Barnes has the type, and has sent me a specimen agreeing with yours, but it is smaller." In the Kootenai list under this name Dr. Dyar mentions two specimens, which, he says, "agree in general with a specimen from Calgary, communicated to me by Rev. George W. Taylor." Mr. Taylor, however, tells me "this is not the species called *multistrigata* by Dr. Dyar in the Kootenai list....The Kaslo species is quite different." I have a Calgary specimen labelled by Mr. Taylor, dated June 21st, 1895, and at least two other specimens are certainly the same, June 23rd and July 4th, 1898. The description does not misfit, but 24 mm. is given as the expanse, whereas mine vary from 25 (♂) to 27 mm. (♀).

459. *E. ravocostaliata*, Pack.—Decidedly rare. April 23rd to end of May.

460. *E. castigata*, Haw.?—Mr. Taylor returned me a ♀ so labelled out of a series I sent him, commenting: "I believe this to be the European *castigata*. I have it from the prairies and from B. C. My identification is made from a comparison with a good series of European specimens." I have taken altogether about two dozen specimens, which I believe to be the same species, all, or nearly all, during 1904, and on the wing just before dusk. June 23rd to July 2nd.

461. *Eucymatoge anticaria*, Walk.—Common. I have specimens so named by both Hulst and Mr. Taylor. June and July.

462. *E. intestinata*, Gn.—Fairly common. June to middle of July.

463. *E. vitalbata*, Schiff.—Common. End May to middle of July. This species, widely distributed in Europe, was first recorded as North American from Calgary. It occurs in Manitoba. I have it from the Red Deer River, a hundred miles north-east of Calgary; so it seems to be a prairie rather than a mountain species in this hemisphere. In Europe the larva feeds on *Clematis vitalba*, the "Traveller's Joy," whence its name, but from localities where I have sometimes found it here it is almost certain that it does not, at any rate, confine itself exclusively to *Clematis* in Alberta.

464. *Euchœca albovittata*, Gn.—Common, though apparently somewhat local in woods, and rarely met with outside them. End June and July.

465. *E. cretaceata*, Pack.—Fairly common. In this district I have found it more commonly on the prairies than in the hills. In the Kootenai list Dr. Dyar seems to imply that there it occurs most frequently at the higher altitudes. I have met with it very sparingly at Laggan, the highest-up capture being at Agnes Lake (6,850 ft.). End June and July.

466. *Calocalpe (Hydria) undulata*, Linn.—Not common. End June to middle Aug.

467. *Eustroma testata*, Linn.—Fairly common. At light, and occasionally at treacle. August.

468. *E. propulsata*, Walk., = *Packardata*, Lint., = *populata*, Pack., non. Linn.—Rather rare. July 20th to Aug. 13th. The synonymy is Mr. Taylor's, who says: "I don't believe we have the real *populata* in America. Dr. Dyar's (Hulst's) synonymy under this name is all wrong." In the Kootenai list Dr. Dyar suggests that European *populata*, Linn, and *Packardata*, Lint., are probably distinct, but records both forms from British Columbia. Mr. Taylor, however, who has compared a good series of the European *populata*, claims that Dr. Dyar's "true *populata*" from B. C. is quite a different insect, and hitherto undescribed.

469. *E. destinata*, Mœschl.—I have taken five or six specimens in the mountains. On Sulphur Mt., Banff, 4,500 to 6,000 feet, and at Laggan up to about the same altitude. The Laggan specimens are a little the smaller. August 7th to 13th, 1900. Mr. Taylor says: "These appear to be variations of what Dr. Dyar decides to be *Eustroma destinata*. It differs considerably from the *destinata* of the prairies." He refers a Calgary male doubtfully to the same species.

470. *E. nubilata*, Pack.—I have two head of Pine Creek specimens, July 29th and Aug. 24th; one from mouth of Fish Creek labelled "July 5th ? Aug.," and one from near Billing's Mill, Aug. 11th. All are more or less rubbed. The last two mentioned have been named as above by Mr. Taylor.

471. *Neolexia xylina*, Hulst.—Described partly from Calgary material: also from New York, Washington, Montana, and "Canada." Dr. Hulst writes: "The specimen received from Calgary has the cross-bands blackish instead of brown, and the hind wings have a more distinct banding. Very much in appearance like *Eustroma prunata*, with which it may have been confounded, but easily distinguished by the bipectinate antennæ." I kept what I considered a duplicate to the specimen mentioned by Hulst, which is identical with the species referred here by Mr. Taylor. The central band is not always blackish, but I see practically no variation in the secondaries. Not common. July 21st to Aug 6th. I have only one female, which is defective in the two right wings. Dr. Dyar records it from the Kootenai district, mentioning Glacier and Field as localities. Mr. Taylor comments upon Hulst's remarks: "*Xylina* is a common B. C. species. I doubt its occurrence in New York. Hulst refers often to *E. prunata*, but he did not know it. The eastern so-called *prunata* is not that species (which is European), but the *triangulatum* of Packard. The differences between *prunata*, *triangulatum* and *xylina* are chiefly in antennal structure."

472. *N. speciosa*, Hulst.—Described from one male from Calgary. Dr. Hulst, after a detailed description, adds: "This may be a variety of *N. xylina*, Hulst, but the colour and shaping of the bands is different, and there is difference of position in the lines of the hind wings." My notes on the material sent to Hulst in 1895 show me that this was a unique sent labelled No. 9. It is probably a head of Pine Creek specimen, bearing no date. I doubt whether I have seen the form since. Hulst's note to me on No. 9 was "*Neolexia xylina*, var. *speciosa*," and the description was published more than a year later. I had sent him the type of *xylina* as No. 10. I copy from his letter: "9 and 10 are perhaps rather widely varying forms of the same species, but I am not sure. I would not think so, only its correlative *Petrophora prunata* has the same variation. It differs from that species, which it resembles in every other way, in having pectinated antennæ in the male."

473. *Plemyria (Rheumaptera) hastata*, Linn.—Common in the spruce. June and early July.

474. *P. tristata*, Linn.—Very common. End May and June.

475. *P. sociata*, Bork.—Common. Middle June to middle July. According to Mr. Charles G. Barrett this is the same as European *subtristata*, Haw., not *substriata*, as Dyar writes it.

476. *P. luctuata*, Schiff.—Very common in the spruce some years, but seems to be rare on Pine Creek. Middle June and July.

477. *P. Georgii*, Hulst.—I always looked upon this as a great rarity until 1903, when it was fairly common. On flowers of *Solidago virgaurea* at night, and also came to treacle. End Aug. and Sept.

478. *P. subrosuffusata*, Pack.—Not rare. May and June. The colour of the secondaries is decidedly an orange-yellow, but I gather from Mr. Taylor that Packard described them as "brick-red." He writes: "I have had abundant material for study, and there is no doubt as to the species. Our specimens and California ones are exactly the same, and apparently our idea of orange-yellow was Packard's notion of 'brick-red.'" Dr. Holland's figure looks like the Calgary species bleached. One of my specimens bears a red-ink label "*Ochyria carneata*," on Hulst's authority.

479. *Zenophleps lignicolorata*, Pack.—Not rare. Middle July to middle Aug. I have it from the flat prairie to the mountains at Banff, but did not see it there above 6,000 feet.

480. *Mesoleuca gratulata*, Walk.—Rather common in the spruce. My only dates are May 30th to June 6th, and my four specimens are perfect. Mr. Taylor says the species is distinctly western.

481. *Mesoleuca cæsiata*, Schiff.—I have taken in good condition at Laggan, from July 18th to Aug. 10th, from 5,700 ft., and occasionally far above the timber line, one capture being on the summit of Saddle Mt., 7,900 ft. I have a head of Pine Creek ♀, taken at light on Sept. 3rd, 1904, which Mr. Taylor refers as a var. of this species. It entirely lacks the faint though obvious ochreous tinge present in the Laggan form, the ground colour is paler, with distinct smoky central and terminal bands. The specimen is somewhat worn. I took an exactly similar specimen during 1905. In the Kootenai list Dr. Dyar says that he found this a high altitude species, and records it from Banff, Alta, on Sept. 10th.

482. *M. lacustrata*, Guen.—Not common. Middle June to middle July. Notwithstanding the generic separation, this species seems rather easy to confuse with *Plemyria sociata* without some knowledge of the

variation of both. I sent both to Mr. Taylor as one species. Dr. Holland's figure of *lacustrata* is not very clear, and scarcely shows what seem to me to be distinctions in my series. I find differentiating characters in the secondaries not noticeable in that figure. In my *lacustrata* the central band widens out considerably on both costa and inner margin, and in seven out of eight specimens is sharply but narrowly notched on vein 7. *Sociata* has the band narrower, more even in width, and in none of my specimens notched. The notch is shown in Dr. Holland's figure, and the band is widest on the costa. Otherwise the figure might easily pass for *sociata*.

483. *M. intermediata*, Gn.—A single male, quite fresh, on May 13th, 1905. I recognized it as something new to me directly I saw it, though the colour and maculation suggested *Xanthorhoe munitata* more nearly than anything else I take here. In Can. Ent., XXXVI, 245, Mr. Taylor points out that Dr. Holland's figure under this name is really *Petrophora fluctuata*.

484. *M. truncata*, Hbn.—Not common. Aug.

485. *M. silaceata*, Hbn., = *albolineata*, Pack.—Rather common. Middle June and July.

486.—*M. hersiliata*, Gn.—Two males, Aug. 15th, 1901, at light, and July 5th, 1903.

487. *M. vasaliata*, Gn.—Rather rare. Earliest April 27th. Through May. A fair female specimen June 17th, and worn females up to July 1st.

(To be continued.)

NOCTUID AND GEOMETRID MOTHS TAKEN AT TEMAGAMI LAKE.

BY D. H. HAIGHT, COPPER CLIFF, ONT.

The following list of moths is the result of collections made during the months of June and July, 1904, in the neighbourhood of Temagami Lake, which is situated in the Nipissing District of Ontario, north of Lake Huron, Lat. 48°. The numbers prefixed are from Dyar's Catalogue:

968. Raphia frater, Grote, June 25.
971. Apatela rubricoma, Guen., June 25.
983. " populi, Riley, June 25.
989. " betulæ, Riley, June 25.
1028. " retardata, Walk., June 25.
1278. Hyppa xylinoides, Guen., July 9.

1288. Euplexia lucipara, Linn., July.
1290. Dipterygia scabriuscula, Linn., June 17–25.
1389 Rhynchagrotis gilvipennis, Grote, July.
1454. Agrotis ypsilon, Rott., June 25.
1462. Peridroma occulta, Linn., June 17.
1511. Noctua cynica, Smith, July.
1517. Chorizagrotis auxiliaris, Grote, June 25.
1702. Paragrotis infausta, Walk., July.
1707. " insulsa, Walk., July.
1782. Mamestra lustralis, Grote, July.
2203. Brotolomia iris, Guen., July 25.
2207. Scoliopteryx libatrix, Linn., June 25.
2483. Autographa bimaculata, Steph., June 17.
2505. " rectangula, Kirby, July 9.
2508. " vaccinii, Hy. Edw., July 14.
2613. Eustrotia carneola, Guen., July 7.
3044. Renia sobrialis, Walk., June 6.
3054. Heterogramma pyramusalis, Walk., June 25.
3058. Palthis angulatis, Hubn., July 7.
3065. Bomolocha baltimoralis, Guen., June 23.
3234. Nyctobia limitata, Walk., July 7.
3248. Eudule mendica, Walk., June 23.
3298. Tephroclystis nimbicolor, Hulst, June 23.
3328. Eucymatoge vitalbata, Den. and Sch., July 7.
3332. Euchœca albovittata, Guen., June 25
3340. Hydria undulata, Linn., July 14.
3348. Eustroma gracilineata, Guen., June 20.
3356. " cunigerata, Walk., July 14.
3359. Rheumaptera hastata, Linn., June 6–July 7.
3371. Mesoleuca ruficilliata, Guen, June 25.
3379. " truncata, Hufn., July 9.
3401. Hydriomena multiferata, Walk., June 17.
3417. Triphosa progressata, Walk., June 25.
3419. Cœnocalpe magnoliata, Guen., July.
3463. Petrophora fluctuata, Linn., June 23.
3497. Cinglis similaria, Walk., July 7.
3502. " albidula, Hulst, June 23.
3515. Leptomeris plantagenaria, Hulst, July.

3546. Eois inductata, Guen., June 25.
3587. Aplodes mimosaria, Guen., June 17.
3604. Eufidonia notataria, Walk., June 17.
3606. Orthofidonia semiclarata, Walk., June 23.
3629. Deilinia falcataria, Pack , June 20.
3908. Therina endropiaria, Grote and Rob., June 25.
3913. Metrocampa prægrandaria, Guen., July 14.
3925. Xanthotype crocataria, Fabr., June 17–July 7.
3941. Gonodontis hypocharia, Herr.-Sch , July 7.
3941a. " lateritiaria, Guen., June 23.
4011a. Tetracis aspilata, Guen., June 20.

The following species were taken at Copper Cliff:

3330. Venusia 12-lineata, Pack., May 6.
3417. Triphosa progressata, Walk., April 29.
3563. Nemoria pistaceata, Guen., May 8.
3606. Orthofidonia semiclarata, Walk., May 6.
3683. Macaria glomeraria, Grote, May 6–8.
3755. Apæcasia defluata, Walk., May 6–21.
3795. Alcis 5-linearia, Pack , June 25.
4037. Brephos infans, Mosch , April 26–May 28.

LIST OF COLEOPTERA IN THE COLLECTION OF J. D. EVANS, TRENTON, ONT., WHICH HAVE NOT HERETOFORE BEEN RECORDED AS HAVING BEEN TAKEN IN CANADA.

25b. Cicindela graminea, Schaupp, N.-W. Terr., J. Macoun, 1879–80.
25g. " spreta, Lec., Sudbury.
" roguensis, Harris, British Columbia.
193. Nebria suturalis, Lec., British Columbia.
331. Bembidium incertum, Mots., Crow's Nest Pass, Rocky Mountains.
388. " intermedium, Kirby, Western Ont.
394. " constrictum, Lec., Halifax, N. S.
408 " dubitans, Lec., Crow's Nest Pass, Rocky Mountains.
718. Dicælus purpuratus, Bon., Pelee Island, L. Erie, J. Macoun, 1882.
756. Platynus dissectus, Lec., N.-W. Terr.
767. " opaculus, Lec., Co. Hastings, Ont.
795. " carbo, Lec., Pelee Island, L. Erie, J. Macoun, 1882.
830. " picicornis, Lec., Co. Hastings, Sudbury and N.-W. Terr.

884. Lebia pleuritica, Lec.? Co. Hastings and Western Ontario, 1882.
1063. Agonoderus pauperculus, Dej., Co. Hastings.
1102. Harpalus innocuus, Lec., N.-W. Terr., J. Macoun, 1879.
1108. " viduus, Lec., Western Ontario, J. Macoun, 1882.
1109. " fraternus, Lec., Man. and N.-W. Terr.
1167. Tachycellus nebulosus, Lec., Co. Hastings.
1189. Anisodactylus nigerrimus, Dej, Co. Hastings.
1220. Haliplus punctatus, Aubé, Co. Hastings.
1278. Bidessus lacustris, Say, Western Ont.
1304. Deronectes catascopium, Say, Co. Hastings.
1310. Hydroporus pulcher, Lec., Co. Hastings.
1356. " humeralis, Aubé, Co. Hastings.
9300. Agabus confinis, Gyll., Belleville, Ont.
1425. " æneolus, Cr., Belleville and N.-W. Terr., J, Macoun, 1879.
1450. " clavatus, Lec., N.-W. Terr., 1886.
1465. Rhantus notatus, Fab., N.-W. Terr., J. Macoun, 1879.
1659. Creniphilus dissimilis, Horn, Sudbury, Ont, 1889.
9335. Cercyon tristis, Ill., Trenton, Ont.
1854. Cholerus Zimmermanni, Schaum, Co. Hastings.
1989. Trimioplectus ruficeps, Lec., Co. Hastings.
2081. Gyrophæna socia, Er., Sudbury.
2175. Philonthus quisquiliarius, Gyll., Co. Prince Edward, Ont., 1900.
2180. " discoideus, Grav., Co. Hastings.
2185. Philonthus fusiformis, Melsh, Co. Hastings, Co. Prince Edward and Toronto.
2204. Philonthus sordidus, Grav., Sudbury and Co. Hastings.
2220. " punctatellus, Horn, Co. Hastings.
2222. " microphthalmus, Horn, Co. Hastings.
2225. " instabilis, Horn, Hudson's Bay, from H. Ulke.
2232. " confertus, Lec., Co. Hastings.
2234. " aurulentus, Horn, Trenton and Toronto.
2235. Actobius cinerascens, Grav., Co. Hastings.
2284. Leptacinus batychrus, Gyll., Co. Hastings.
2287. " longicollis, Lec., Co. Hastings.
2514. Lathrobium quadratum, Payk., Trenton.
2626. Tachinus pallipes, Grav,, Sudbury and Co. Hastings.
2629. " basalis, Er., Co. Hastings.
2669. Bryoporus flavipes, Lec., Co. Hastings.
2776. Trogophlœus memnonius, Er., Trenton.
2828. Olophrum obtectum, Er, Co. Hastings.
2895. Triga picipennis, Lec., Co. Hastings and Sudbury.

2966. Trichopteryx Haldemanni, Lec., Co. Hastings and Trenton.
3044. Hippodamia glacialis, Fab., N.-W. Terr.
3059. Coccinella v. 5-notata, Kirby, Sudbury.
3059a. " transversalis, Muls., Crow's Nest Pass, Rocky Mountains.
3162. Scymnus punctatus, Melsh., Co. Hastings.
3189. Mycetina testacea, Ziegl., Co. Hastings, 1884.
Crasimus hirtus, Casey, Co. Hastings, 1884.
3356. Loberus impressus, Lec., Trenton and Sudbury.
3374. Cryptophagus fungicola, Zimm., Trenton and Sudbury.
" laticlavus, Casey, Trenton.
" depressulus, Casey, Sudbury.
9923 " acutangulus, Gyll., Sudbury and Trenton.
Agathengis pumilis, Casey, Co. Hastings and Sudbury.
Atomaria oblongula ? Casey, Trenton.
" distincta, Casey, Trenton.
3535. Epierus pulicarius, Er., Co. Hastings and Co. Prince Edward.
3564. Paromalus bistriatus, Er., Trenton and Sudbury.
3579. Saprinus posthumus, Mars., Sudbury.
3614. " sphæroides, Lec., Western Ont.
3723. Stelidota 8-maculata, Say, Co. Hastings.
3798. Corticaria serricollis, Lec., Sudbury and Trenton.
3833. Trogosita virescens, Fab., British Columbia.
3965. Heterocerus collaris, Kies., Co. Hastings.
3970. " undatus, Melsh., Co. Hastings.
3986. Philodactyla serricollis, Say, Trenton.
4064a. Anelastes Latreillei, Lec., Trenton and Crow's Nest Pass, Rocky Mountains.
4092. Alaus lusciosus, Hope, Western Ont.
4099. Cardiophorus erythropus, Er., Western Ont.
4105. " fenestratus, Lec., Trenton and British Columbia.
4300. Glyphonyx testaceus, Melsh., Western Ont.
4317. Melanotus Leonardi, Lec., Ottawa, Ont.
4351. Limonius Crotchii, Horn, British Columbia.
4373. " propexus, Cand., Western Ont.
4488. Corymbites carbo, Lec., British Columbia.
4568. Chalcophora angulicollis, Lec , British Columbia.
4600. Buprestis confluens, Say, N.-W. Terr.
4605. " laeviventris, Lec., British Columbia, 1887.
4610. " aurulenta, Linn., British Columbia, 1887.
4640. Chrysobothris carinipennis, Lec., British Columbia.

4766. Pachyscelus lævigatus, Say, Western Ontario.
4889. Podabrus pruinosus, Lec., British Columbia.
5110. Dolichosoma foveicolle, Kirby, Sudbury.
5230. Necrobia rufipes, Fab., Co. Hastings.
5240. Ptinus brunneus, Duft., Co. Hastings.
5468. Aegialia lacustris, Lec., Co. Hastings.
10175. " rufescens, Horn., Co. Hastings, 1884.
5524. Aphodius congregatus, Mann., N.-W. Terr.
5562. " alternatus, Horn, Manitoba.
5568. Aphodius prodomus, Brahm., Co. Hastings, Co. Prince Edward and Ottawa.
5597. Geotrupes semiopacus, Jek., Co. Hastings.
10241. Lachnosterna grandis, Smith, Sudbury and Co. Hastings.
10256. " innominata, Smith, Montreal, Can.
5778. " ciliata, Lec., Co. Hastings.
5782. " balia, Say, Western Ont.
10257. " limula, Horn, N.-W. Terr.
5858. Cyclocephala immaculata, Oliv., Co. Hastings.
5960. Prionus pocularis, Dalm., Co. Hastings.
5963. " fissicornis, Hald., Sudbury.
5980. Criocephalus australis, Lec., Co. Hastings.
6269. Acmæops ligata, Lec., British Columbia.
6282. Strangalia acuminata, Oliv., Co. Hastings.
6302. Leptura deleta, Lec., Co. Hastings.
6323. " instabilis, Hald., British Columbia.
6363. " aspersa, Lec., British Columbia.
6385. Monohammus titillator, Fab., Co., Hastings.
6418. Leptostylus biustus, Lec., Co. Hastings.
6428. Liopus fascicularis, Harr., Co. Hastings and Western Ont.
10335. Donacia pusilla, Say, British Columbia and Co. Hastings.
6542. " pyritosa, Lec., Sudbury.
10336. " rufa, Say, Western Ont. and Co. Hastings.
6531. " porosicollis, Lac., Co. Hastings.
6556. Zeugophora consanguinea, Cr., Co. Hastings.
6567. Lema collaris, Say, Co. Prince Edward.
6596. Babia 4-guttata, Oliv., Co. Hastings.
6604. Exema gibber, Oliv., Western Ont.
10386. Scelolyperus Schwarzii, Horn, British Columbia.
6899 Galerucella americana, Fab., Manitoba.
10416. Disonycha crenicollis, Say, Co. Prince Edward.
6982. Crepidodera Modeeri, Linn., Co. Hastings and Montreal.

7007. Longitarsus melanurus, Melsh., Trenton and Co. Prince Edward.
10434. " turbatus, Horn, Trenton.
7394. Iphthimus serratus, Mann., British Columbia and Western Ont.
7396. Cœlocnemis dilaticollis, Mann., British Columbia.
7526. Phylethus bifasciatus, Say, Co. Hastings.
7556. Helops californicus, Mann., British Columbia.
7615. Mycetochares Haldemani, Lec., Co. Hastings.
10690. Isomira tenebrosa, Casey, Trenton.
7684. Hallomenus punctulatus, Lec., Sudbury.
7692. Canifa plagiata, Melsh., Sudbury.
Mordella irrorata, Lec., Halifax, Co. Hastings and Sudbury.
7796. Mordellistena arida, Lec., Co. Hastings.
7868. Nematoplus collaris, Lec., Sudbury.
Elonus princeps, Casey, Co. Hastings.
Vanonus Wickhami, Casey, Trenton.
10727. Anthicus basilaris, Say, Sudbury, 1892.
7961. " Haldemani, Lec., Co. Hastings.
7980. " melancholicus, Laf., Co. Hastings.
8099. Epicauta oregona, Horn, N.-W. Terr.
8158. Cantharis sphæricollis, Say, Manitoba.
8211. Rhynchites æneus, Boh., Western Ont. and Manitoba.
8223. Pterocolus ovatus, Fab., Co. Hastings.
8293. Mylacus saccatus, Lec., British Columbia.
8443. Listronotus callosus, Lec., Ottawa, Ont.
8449. " sulcirostris, Lec, Co. Hastings.
8563. Phyllotrox nubifer, Lec., Co. Hastings.
11043. Xanthus pygmæus, Dietz., Trenton.
8838. Ceutorhynchus rapæ, Gyll., Co. Hastings.
8860. Cœlogaster Zimmermanni, Gyll., Trenton.
8872. Baris transversa, Say, Co. Hastings.
8982. Sphenophorus Ulkei, Horn, N.-W. Terr.
9146. Scolytus unispinosus, Lec., British Columbia.
9167. Hylesinus aspericollis, Lec., Victoria Island.
9191. Hylastes nigrinus, Mann., Sudbury and Co. Hastings.
9200. Hylurgops rugipennis, Mann., British Columbia.

Almost all of the foregoing list have been determined during the past 25 years by Mr. Henry Ulke, the late Dr. Jno. Hamilton, Prof. H. F. Wickham, Mr. J. D. Sherman, Jr., and others, to whom I have been, and am, deeply grateful for all the kindness bestowed.

ON THE SPECIES OF *EUPITHECIA* OCCURRING AT CALGARY, ALBERTA, WITH DESCRIPTIONS OF FOUR SUPPOSED TO BE NEW.

BY GEO. W. TAYLOR, WELLINGTON, B. C.

Through the kindness of Mr. F. H. Wolley Dod, I have now in my cabinet specimens of 13 species of "Pugs" taken by him in the neighbourhood of Calgary.

Three of these belong to well known and widely-distributed species, viz: Eupithecia cretaceata, Pack.; E. ravocostaliata, Pack.; and Eucymatoge anticaria, Walker.

All the others presented difficulties at first sight, but I have at last identified five of them, I hope correctly, and I herewith offer descriptions of four which I suppose to be new to science. The remaining species is certainly different to any of the others, but I have only seen a single specimen, and therefore think it desirable to defer characterizing it.

The five species already described, in addition to the three named above, are:

Eupithecia nimbicolor, Hulst.—I determined this species from Dr. Hulst's description, but I have since had the opportunity of seeing a specimen which Mr. Wolley Dod thinks was returned to him by Dr. Hulst as conspecific with the type of *nimbicolor*, which was also a Calgary specimen. There is not much doubt, I think, but that we have this species correctly identified.

E. multiscripta, Hulst.—This species was described from Colorado. Dr. Barnes has the type, and he has kindly given me a specimen agreeing therewith. Mr. Wolley Dod's specimens are larger and more heavily marked, and have the margins of the hind wings rather more rounded out, but I should not like to separate them specifically from *multiscripta* without first seeing a larger number of the Colorado form. I may say here that the specimens from Kaslo which are recorded by Dr. Dyar (Proc. U. S. Nat. Mus., XXVII, 890) under this name are, in my opinion, clearly distinct, and I propose for them the specific name *Dyarata*.

E. borealis, Hulst.—This species was described from Winnipeg, and I have seen a specimen in Mr. A. W. Hanham's collection so named by Dr. Hulst.

The published description, however, does not fit the insect at all well.

I have good specimens from Mr. Wolley Dod which do not differ in any respect from those taken at Winnipeg by Mr. Hanham.

E. Casloata, Dyar. – Dr. Dyar's types were from Kaslo. This is a large species of the *absynthiata* group, and not likely to be confused with anything else we have on the west coast. Mr. Wolley Dod's specimens (Nos. 114 and 115) agree exactly with others from Kaslo. I have the species from other points in Alberta, through the kindness of Mr. T. N. Willing.

E. castigata, Hubner.—This is a common European species, but specimens taken in B. C. and Mr. Wolley Dod's Nos. 117, 134 and 141 are so very close to those sent me from England that I have decided to include them all under one name. I may be wrong, for there is always a risk in applying European names to American moths, but I really cannot see any differences that I can express in words.

The following species are, I think, new to science :

Eupithecia Regina, n. sp.—Expanse 20 mm. About the size of and otherwise closely resembling *Eupithecia scriptaria*, H. Sch. Palpi short and stout. Abdomen gray, with brown tinge, dorsal tufts black, no transverse band on 2nd segment. Wings rather short, apex rounded.

Fore wings of a soft, even gray (in one specimen tinged with brown), and crossed by many pale, wavy lines. In a perfectly fresh specimen nine of these can be distinguished. The first two are close together, and parallel, and limit the darker basal area. The third is the widest, and includes a very minute discal dot. The next two are very faint, then two more distinct exactly parallel, and occupying the place of the usual extra-discal line ; then a very faint one, and lastly, the usual submarginal line. All these pale lines are most conspicuous on the costa. There is a marginal black line interrupted at the veins ; fringe the colour of the wings, but darker basally.

Hind wings with similar markings, but much obscured, except the double extra-discal line, which is clearly traceable.

Beneath paler, fore wings with basal half smoky, costa with six or seven dark spots, discal spot linear and quite distinct ; about six fairly evident extra-discal lines.

Hind wings with about seven distinct dark lines, and a very small discal dot ; fringe checkered.

Described from five specimens : One from Regina (Mr. T. N. Willing), 25th June, 1905, and four from head of Pine Creek, Calgary (Mr. F. H. Wolley Dod), June 29, 1904 ; July 7, 1901 ; July 22, 1903 ; August 2, 1903.

Eupithecia Alberta, n. sp.—Expanse 25 mm. Palpi short and stout. Abdomen brownish, with paler dorsal line; no band on 2nd segment.

Fore wings brown, much produced, all margins rounded, so much so that the inner angle of fore wings is almost obliterated. Cross lines very faint, all of them in general direction parallel to outer margin; the submarginal whitish line is the most distinct; discal dot small, black; marginal line of black dashes.

Hind wings paler, with marginal dusky band and traces of three or four dark lines on inner margin; discal dot minute, marginal line black; six or seven distinct dots on fringe.

Beneath paler, with the markings of the upper side faintly reproduced; discal dots distinct, black.

Hind wings with two outer discal broad lines emphasized on the veins, fringe distinctly spotted.

The peculiar rounding out of all the margins of the fore wings will serve to distinguish this species from all other Canadian Eupithecias.

Described from two specimens: Head of Pine Creek, Calgary (Mr. Wolley Dod). Both specimens were taken at light, June 30, 1904.

Eupithecia Dodata, n. sp.—Expanse 22 mm. Palpi long and stout. Abdomen mottled gray and brown; dorsal tufts black; first segment pale, second darker.

Fore wings gray, thickly overlaid with fuscous scales, giving them a mottled appearance; many dark, very indistinct cross lines, showing as dark spots on costa and as dots on the veins. Basal line rounded; intra-discal parallel to it; extra discal interrupted, but showing in black dots on veins 2, 3, 4, 5 and 6; a similar series of dots, indicating another parallel line between this and the rather conspicuous white submarginal line, which is terminated by a distinct white dot below vein 2; marginal line black; fringe spotted; a black discal spot.

Hind wings same colour as fore wings, a dark submarginal shade; faint indications of cross lines; discal dot small; marginal line black, distinct.

Beneath paler, discal dots distinct; two extra-discal lines on all wings, commencing as rather large dark blotches on costa of fore wings; marginal line black, distinct; fringe spotted.

Described from two specimens: Head of Pine Creek, Calgary (Mr. F. H. Wolley Dod), 27th June and 3 d July, 1904.

I hope no classical scholar will enquire as to the derivation of the specific name.

Eupithecia adornata, n. sp.—Expanse 24 mm. Palpi short, porrect. Abdomen gray, mottled with brown; hind margin of each segment brown.

Fore wings produced, costa very straight, outer margin oblique; colour gray, overlaid with reddish brown scales, the gray predominating in the central band, and the brown in the basal and marginal areas; basal line black, very close to the base; central band, including about six dark lines, most evident on the costa; discal spot not discernible above, except in one specimen; submarginal line a series of white dots only; marginal line of black dashes, followed by a whitish line at the extreme base of the fringe, which is spotted.

Hind wings with markings of fore wings continued, but very indistinctly.

Beneath fore wings smoky, markings hardly discernible.

Hind wings with two intra-discal and three (sometimes only two visible) extra-discal lines; marginal line and fringe as above; very minute discal dots.

Described from six specimens: Head of Pine Creek, Calgary (Mr. F. H. Wolley Dod), May 25th and 30th, June 3rd, 5th, 10th and 14th.

This species is evidently nearly allied to *Eupithecia Coloradensis*, Hulst, a species I have not yet seen, but I do not think, after studying the description, that it can be the same.

The Calgary list will now stand as follows:

1. Eupithecia Regina, Taylor.
2. " castigata, Hubner.
3. " sp.
4. " Dodata, Taylor.
5. " borealis, Hulst.
6. " multistrigata, Hulst.
7. " adornata, Taylor.
8. " nimbicolor, Hulst.
9. " Casloata, Dyar.
10. " Alberta, Taylor.
11. " ravocostaliata, Pack.
12. " cretaceata, Pack.
13. Eucymatoge anticaria, Walker.

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A FIRST LIST OF ONTARIO ODONATA.

BY E. M. WALKER, B. A., M. B., TORONTO.

The following list of Odonata is mainly the result of four seasons' collecting in various parts of Ontario, but chiefly in three localities, viz. : Toronto; De Grassi Point, Lake Simcoe, and Algonquin Park.

Although most of the material was collected by the writer, the list has been considerably lengthened by the records of captures made by other collectors. Among these should be mentioned the collections of Dr. Wm. Brodie, in the Educational Dept., Toronto ; many specimens taken in Algonquin Park by Prof. Macoun in 1900, and by Mr. Paul Hahn in 1903–4 ; a considerable number from the collection of the Biological Dept. of the University of Toronto, consisting chiefly of alcoholic specimens of nymphs and imagoes taken at the Biological Experiment Station at Go Home, Georgian Bay, and a few collected and presented to the Department by the late Mr. R. T. Anderson; and finally, a small collection from Thessalon, Algoma, belonging to Miss Rounthwaite, of Toronto.

The names have also been added of a few species previously known from Ontario, of which no specimens have been seen by the writer.

When the Odonatological fauna of Ontario is thoroughly known, it will doubtless prove to be considerably richer than is indicated by the present list, which does not pretend to completeness. It would, therefore, have been better, perhaps, to have delayed its publication for a few seasons until more material had been collected, if the writer had not been obliged to discontinue for an indefinite time the work necessary for that purpose. Our fauna should embrace at least 100 species, probably considerably more. The genera that should yield the greatest number of unrecorded species are *Somatochlora*, *Gomphus* and *Enallagma*.

Somatochlora is a boreal genus, and many species not yet known from Ontario will surely appear in the far north, *e. g.*, *S. albicinata* (Burm.), *Franklini* (Selys), *Hudsonica* (Selys), and *Walshii* (Scudd.). Of *Gomphus*, the material upon which this list is based is but scanty, and yet

includes ten species. There should be at least fifteen. *G. abbreviatus* Selys, *fraternus* (Say), *vastus* Walsh, *descriptus* Banks, *Ophiogomphus colubrinus* Selys, and *Lanthus parvulus* Selys, are all probably residents. The writer has never collected in a good Gomphine locality at the proper season. *Leucorhinia* should furnish one or two more species in the north, such as *L. Hudsonica* (Selys) and *proxima* Hagen, while *Argia* ought to be better represented in the south, *A. tibialis* (Ramb) and *sedula* (Hagen) being not unlikely to occur in the Upper Austral Zone along Lake Erie. Of other Zygopterous species, *Hetærina Americana* (F.), *Amphiagrion saucium* (Burm.), *Anomalagrion hastatum* (Say), and *Ischnura posita* (Hag.), are almost sure to turn up in the same zone, if not further north.

The writer acknowledges with gratitude the kind assistance of Drs. J. G. Needham and P. P. Calvert in the determination of many specimens.

Sub-order ZYGOPTERA.

Family CALOPTERYGIDÆ.

1. *Calopteryx maculata*, Beauv.—Hamilton, June; Toronto, June 22–July; Berlin, July–Aug., (W. J. Fraser); De Grassi Pt., Lake Simcoe, July 6–Aug.; Algonquin Park, July–Aug; Thessalon, Algoma.

An abundant species along the banks of woodland streams.

2. *Calopteryx æquabilis*, Say.—Berlin, July–Aug., abundant (W. J. Fraser); London; Algonquin Park, July 25, 1900, Aug. 31, 1902; Thessalon, Algoma; Michipicoten, L. Superior (Hagen, *C. Hudsonica*). The dark patch at the apex of the fore wings is broader and more sharply defined in the specimens from Algonquin Park than in those from Berlin. The only female I have seen is the single example from Thessalon, in which the wings are only just perceptibly deeper at apex than elsewhere.

Family AGRIONIDÆ.

Sub-family *Lestinæ*.

3. *Lestes congener*, Say.—Niagara Glen, Aug. 18, 1904; Algonquin Park, Aug. 14–29, 1902–'04, abundant.

4. *Lestes unguiculata*, Say.—Chatham, Aug. 10, 1901; Sarnia, Aug. 12, 1901; Berlin (W. J. Fraser); Walpole Id., River St. Clair, Aug. 13, 1901; Point Pelee, Aug. 8, 1901; Thessalon, Algoma; Toronto, July 6, 1904; De Grassi Pt., July 7, 1901. A common species.

5. *Lestes uncata*, Kirby. — Hamilton (Anderson, Biol. Dept., Toronto); Toronto, June 15–July 6; De Grassi Pt., Aug.; Algonquin Park, Aug. 13, 1903. A scarce species wherever I have taken it.

6. *Lestes disjuncta*, Selys.—Toronto, July 15–Aug., 1904, abundant along the banks of the Humber River and in neighbouring woods; Toronto Island, July 25, 1904, flying over the lagoons; Lake Simcoe, Aug., abundant along the margins of creeks; Algonquin Park, Aug. 13, 1903.

7. *Lestes rectangularis*, Say.—Chatham, Aug. 10, 1901; Niagara Glen, June 28, 1903; Toronto, June 24, 1904, Aug. 9, 1903; De Grassi Pt., July–Aug.; Algonquin Park, Aug. 11–29, 1903. A common but not abundant species.

8. *Lestes vigilax*.—Sarnia, Aug. 8, 1901; Grenadier Pond, Toronto, late June–Aug. A very local species, exceedingly abundant around Grenadier Pond. I have reared the flies from nymphs taken from the margins of the pond.

Sub-family *Agrioninæ*.

9. *Argia putrida*, Hagen.—Algonquin Park, July 15, 1900, one teneral (J. Macoun), Aug. 15–21, 1904 (P. Hahn). I found the exuviæ on a timber slide at Ragged Lake, Algonquin Park, Aug., 1902. This species will doubtless be found commonly along the shore of Lake Erie.

10. *Argia apicalis*, Say.—Chatham, Aug. 10, 1901; abundant along the banks of the Thames.

11. *Argia violacea*, Hag.—Algonquin Park, Aug. 17, 1903.

12. *Chromagrion conditum*, Charp.—Berlin, Aug., numerous (W. J. Fraser).

13. *Nehalennia irene*, Hag.—Toronto, June 22–July, common, especially around Grenadier Pond; Rosebank, June, 1903; De Grassi Pt., July–Aug. 3, 1903.

14. *Amphiagrion saucium*, Burm.—Reported from Ontario by Calvert (Cat. Odon. Phil., 236, 1893).

15. *Enallagma Hageni*, Walsh.—Toronto, June 9–July; Rosebank, June; De Grassi Pt., July; Go Home, Georgian Bay, July 18, 1904; Algonquin Park, Aug. 17–28, 1904. Our commonest *Enallagma*, occurring in swarms around Grenadier and other ponds in June.

16. *Enallagma geminatum*, Kellicott.—Toronto, Grenadier Pond, July 11–14, 1904. Not common.

17. *Enallagma exsulans*, Hag.—Chatham, Aug. 10, 1901; De Grassi Pt., July 18, 1904; Algonquin Park, Aug. 24, 1902.

18. *Enallagma ebrium*, Hag.—Toronto, June 3–14, 1901, Aug., abundant; De Grassi Pt., July 3, 1904, common; Algonquin Park, Aug., 1904 (P. Hahn). Nearly as common as *E. Hageni*, except northward.

19. *Enallagma Calverti*, Morse.—Berlin, Aug. 31, 1904, 1 ♂ (W. J. Fraser); De Grassi Pt, July 9, 1901, 1 ♂.

20. *Enallagma carunculatum*, Morse.—Toronto, June 27–Aug., 1904, common; De Grassi Pt., July 19–Aug., common: Go Home, Georgian Bay, July 18, 1904.

I have bred this late-appearing species from nymphs taken in Grenadier Pond and in Lake Simcoe. It is the only Zygopterous dragonfly that breeds in the clear, wave-tossed waters of Lake Simcoe, although others occur in the shallow reedy places near the shore. The nymphs climb up the timbers of the wharf, and up reeds growing from a depth of several feet.

21. *Enallagma antennatum*, Say. — Berlin, Aug. (W. J. Fraser); Toronto, June 24–July 6. Abundant along the banks of the Don River, where few other species occur.

22. *Enallagma signatum*, Hag. — Toronto, July 5–14, 1904, in small numbers around Grenadier Pond.

23. *Agrion resolutum*, Hag.—Toronto, June 11, 1904; Rosebank, June, 1903. The Toronto specimens of this interesting boreal insect were taken at Grenadier Pond, in company with *E. Hageni*.

24. *Ischnura verticalis*, Say.—Point Pelee, Aug. 8, 1901; Chatham, Aug. 10, 1901; Sarnia, Aug. 12, 1901, Toronto, June 10–Aug, 1904; Lake Simcoe, July–Aug.; Algonquin Park, Aug. 8–29, 1903–'04. Our most abundant species of Agrionidæ. The orange female is much more numerous than the black one.

25. *Ischnura Ramburii*, Selys.—Reported from Ontario by Calvert (Cat. Odon. Phil., 240, 1893).

Sub-order ANISOPTERA.

Family ÆSCHNIDÆ.

Sub-family *Gomphinæ*.

26. *Ophiogomphus rupinsulensis*, Walsh. — Algonquin Park, Aug. 15–30, 1902–'03. Common over shallow rapids on the North Branch of the Muskoka River.

27. *Hagenius brevistylus*, Selys.—Toronto (Wm Brodie); De Grassi Pt., 1 exuvia, Aug.; Go Home, Georgian Bay, June 30, 1903, many examples transforming; Algonquin Park, Aug. 20–22, 1903, 3 ♂ ♂, all slightly worn, and a few exuviæ.

28. *Lanthus albistylus*, Selys. — Algonquin Park, Aug. 14, 1903. Locally common over rapids on the North Branch of the Muskoka River, but only 1 ♂ taken.

29. *Gomphus brevis*, Hag.—Algonquin Park, Aug. 20, 1903. A pair much worn, and two exuviæ.

30. *Gomphus exilis*, Selys.—Toronto (W. Brodie); De Grassi Pt., June 30–July 9, 1901–'04; Go Home, Georgian Bay, June 22, 1903, 1 ♂ with exuvia, newly emerged; Algonquin Park, Aug., exuviæ. Probably our commonest Gomphus.

31. *Gomphus borealis*, Needh.—A male of what seems to be this species is in the collection of Dr. Brodie, in the Educational Dept., Toronto. It is without a label, but was found in a box containing specimens of various orders of insects, apparently all from Ontario. There is a little yellow on the outer surface of the tibiæ, but the male appendages agree so closely with Needham's figures of *borealis* that there seems little doubt that it belongs here.

32. *Gomphus sordidus*, Hag.—Go Home, Georgian Bay, June ?, 1903; 1 ♂ with exuvia, freshly emerged. Dr. Calvert, who saw this specimen, writes me that it is "apparently *sordidus*." The abdomen of the nymph is proportionately somewhat broader than that of *G. descriptus*, as described by Needham, who says the nymphs of *sordidus* are "entirely similar to that species in habits and appearance" (Aquatic Insects in the Adirondacks, Bull. 47, N. Y. State Mus., p. 455).

33. *Gomphus crassus*, Hag.—Niagara Glen, July 4, 1903, 2 ♀♀. This is the most northern record for this species.

34. *Gomphus Scudderi*, Selys. — Algonquin Park, Aug. 17–30, 1902–'03. Common over gentle rapids on the North Branch of the Muskoka River.

35. *Gomphus plagiatus*, Selys.—Algonquin Park, Aug. 11, 1903, one exuvia from muddy shore of river.

36. *Gomphus spicatus*, Hagen. — Hamilton? (Anderson); Port Sidney, May 18, 1899 (W. Brodie). It has also been reported from Ontario by Hagen.

37. *Gomphus villosipes*, Selys.—Toronto, July 24, 1901, 1 ♂, found flying around a small pond.

38. *Gomphus furcifer*, Hagen.—Toronto, June 15–20, 1903–'04; De Grassi Point, July 15, 1901. Not infrequent in Toronto, where it breeds in Grenadier Pond.

39. *Dromogomphus spinosus*, Selys.—Toronto, Grenadier Pond, June 24, 1904; De Grassi Point, July–Sept. 17, 1901, common; Thessalon, Algoma.

At Lake Simcoe the nymphs crawl out upon the rocks or clay banks of the wave-beaten shore, where they transform. They never crawl more than three or four feet from the water's edge. The imagoes fly over the lake near the shore, and in openings in the woods within half a mile or so of it.

(To be continued.)

A NOTE ON THE EUCHOECA COMPTARIA MUDDLE.

BY HARRISON G. DYAR, WASHINGTON, D. C.

I have carefully separated out my material by Mr. Pearsall's latest (Can. Ent., xxxviii, 33, 1906) and find all the forms before me. I cannot agree that the arrangement is final. In the first place, in describing the genus *Nomenia*, Mr. Pearsall mentioned as type *12-lineata*, Pack., which he now transfers to *Euchœca*, and makes a new name, *unipecta*, Pears., for the type species. This strikes me as a contravention of the rules. An author can no more change his own names than those of another, nor his own determinations, when they are made as a restriction of a heterotypical species. Mr. Pearsall's first restriction of *12-lineata* to the Western form with unipectinate antennæ will hold; the form with simple antennæ latterly interpreted as *12-lineata* may be called *Pearsalli*. I have four specimens before me from Victoria, B. C. (E. M. Anderson); Seattle, Wash. (T. Kincaid); Huachuca Mts., Arizona (Dr. Barnes); and a fifth, doubtful, from Kaslo, B. C. (Dyar).

In the second place, Mr. Pearsall has neglected two names of Walker's, *condensata* and *inclinataria*, heretofore referred to the synonymy. The former I should say was *exhumata*, Pears., judging from the description; the latter not referable here at all, as Walker states the antennæ to be pectinated. My arrangement would be as follows:

NOMENIA, Pearsall.
duodecemlineata, Packard.
= *unipecta*, Pearsall.
var. secunda, Pearsall.
EUCHŒCA, Hübner.
condensata, Walker.
= *exhumata*, Pearsall.
Pearsalli, Dyar.
comptaria, Walker.
= *perlineata*, Packard.
= *salienta*, Pearsall.

ON ACIDALIA SUBALBARIA, PACKARD, AND SOME ALLIED FORMS.

BY GEO. W. TAYLOR, WELLINGTON, B. C.

1. In 1874 Dr. Packard[1] described and figured a Californian Geometer under the name *Acidalia subalbaria*. The type was one female, and the specimen was figured in the photographic plate accompanying the paper.

In his monograph[2] Dr. Packard repeats the description word for word, merely adding after the word antennæ, "which are well pectinated in the male" (for at this time he had both sexes of the species), and at the end of his account he says, "the male antennæ are well pectinated, an unusual exception to their ordinary form in this genus." A lithographed figure is given (Mon. plate x, p. 63) of the male specimen, but the markings are emphasized in a way which gives a wrong impression as to their distinctness. The photograph in the earlier paper, though from a very indifferent specimen, gives a much better idea of the species as it is known to me.

In 1895 Dr. Hulst[3] states, on the authority of the late Mr. Moffat, that the type of *Acidalia anticaria*, Walker, in the collection of the Entomological Society of Ontario "is probably the same as *A. subalbaria*, Pack." In his "Classification," and again in the Geometrid portion of Dyar's Catalogue, Dr. Hulst, apparently on this slender evidence, places the species in the genus *Eois* as a synonym of *anticaria*, Walker. But anyone reading Walker's description[4] of *anticaria* can see at a glance that he is writing of a true *Sterrhid*: "head black in front," "antennæ pubescent," "discal point black,"—these are all characters quite in keeping with an *Eois*, but not at all agreeing with Packard's *subalbaria*, which by Packard's own showing is not a *Sterrhid* at all, but a *Diastictis*.

I have in my cabinet a specimen quite typical of this form, received through the kindness of Prof. C. F Baker, and taken in Southern California.

2. A very similar species of *Diastictis* was described by Dr. Dyar, in his paper on the Lepidoptera of the Kootenai District,[5] as *Cymatophora Matilda*.

I have one of Dr. Dyar's co-types in my collection, and also a long series from various British Columbian localities, and from Verdi, Nevada.

1. Proc. Bost. Soc. Nat. Hist., XVI, p. 28, fig. 15.
2. Monograph Geom. Moths, p. 334.
3. Ent. News, VI, p. 72.
4. Cat. Lep. Het. Br. Mus., XXVI, p. 1593.
5. Proc. U. S. Nat. Mus., XXVII, p. 907.

This form is very closely allied to *subalbaria*, Packard, but in my opinion the two are quite distinct.

They are, however, according to Dr. Dyar,[6] confused in the Hulst collection, being there united under the name (not really applicable to either of them) *Eois anticaria*, Walker.

3. If it is admitted that *subalbaria*, Packard, belongs to the genus *Diastictis*, and I do not think there can be any doubt about the matter, then the specific name will clash with that of the *Diastictis subalbaria*, Hulst,[7] described from Colorado, and I therefore propose for that species the name *Diastictis Hulstiaria*. I have seen specimens of this species determined by Hulst himself from Manitoba, and I presume they correctly represent his species. I have similar specimens from Calgary, and I believe that the species listed by Dr. Dyar[8] from Kaslo in error, as *Deilinia variolaria*, is the same thing.

4. Dr. Hulst described still another white *Diastictis* in his last paper[9] as *Cymatophora virginalis*. The description is very short and inadequate, but it would seem to refer to a smaller insect, "expanse 22 mm.," and the few details given do not apply accurately to the specimens I have placed under *Hulstiaria*. At the same time I must admit that I have received specimens from the Catskill Mountains (Dr. Pearsall), which were said to have been identified by Hulst himself as *virginalis*, which I cannot separate from those I have spoken of above. It is probable, however, that the study of more abundant material, and a careful examination of Hulst's actual types, may demonstrate that *Hulstiaria* and *virginialis* are distinct, though very closely allied.

The species considered in this article should stand in our lists as follows :

Diastictis subalbaria, Pack., non Hulst, California.
" Matilda, Dyar, Col., B. C., Nevada.
" Hulstiaria, Taylor, Col., Manitoba, B. C.
= subalbaria, Hulst, non Pack.
" virginalis, Hulst, Atlantic States.

And the reference to *subalbaria*, Pack., under *Eois anticaria*, Walker, must be struck out.

6. Proc. Ent. Soc. Wash., Vol. VI, p. 224.
7. Trans. Amer. Ent. Soc., XXIII, p. 333.
8. Proc. U. S. Nat. Mus., XXVII, p. 905.
9. Jour. New York Ent. Soc., VIII, p. 218.

NEW COLEOPTERA FROM THE SOUTH-WEST.—II.

BY H. C. FALL, PASADENA, CALIFORNIA.

The new species in the writer's collection selected for description in the following pages are representatives of the genera Cymatodera and Hydnocera, of the Cleridæ, and have been now chosen in order that their publication may be as nearly contemporaneous as possible with the recent descriptions of new species by Mr. Schaeffer and Dr. Skinner, whose articles have aroused some present interest in this family.

Cymatodera delicatula, n. sp.—Very small, similar in most respects to *puncticollis*. Brown, antennæ and legs uniformly rufotestaceous, front of head, apical and basal margins of prothorax and apex of elytra gradually paler; elytra with a broad, antemedian yellowish transverse fascia, which is not at all narrowed at the suture. Antennæ stout, nearly half the length of the body, joints 2-4 subequal and smaller than those following, outer joints subcylindrical, gradually wider apically, but not at all triangular; last joint longer, obtusely pointed. Eyes very prominent, especially in the ♂, in which they are separated on the front by a distance scarcely greater than their own vertical diameter. Head and prothorax very minutely sparsely punctate, the latter much wider at apex than at base; basal constriction strong, apical constriction moderate, width at middle subequal to that at apex. Elytra at base nearly twice as wide as the base of the prothorax, humeri rectangular, sides slightly diverging posteriorly, striæ consisting of quite coarse perforate punctures, which become finer at apex; intervals as wide as the punctures near the suture, becoming narrower at sides; each with a row of fine distant punctures; pubescence fine, rather long, suberect, the alternate interspaces with widely-spaced, longer, somewhat stouter, erect hairs, which are most conspicuous on the third.

Length, 3.2–4.2 mm.

Male.—Fifth ventral with posterior margin scarcely visibly emarginate; the sixth broadly feebly arcuato-emarginate from side to side: last dorsal rounded and feebly notched.

Female.—As in *puncticollis*.

Described from a single pair sent me by Mr. Beyer, by whom they were taken at Santa Rosa, Lower California. This species is closely related to *puncticollis*, but appears to be distinct in its somewhat less coarsely punctate elytral striæ, broader, complete transverse fascia, colour

of legs, and less distinctly emarginate fifth and sixth ventrals in the male. The antennæ are obviously gradually incrassate outwardly, a form not mentioned in the description of *puncticollis*, nor indicated in Horn's figure. The original description of *puncticollis* by Bland differs in some respects from the later one by Horn. The elytra of the type being, as indicated by Bland, in great part pale, with an indistinct subbasal band and a broader, distinct one at apical third : a style of coloration which nearly agrees with the closely-allied *sirpata*, but not with *delicatula*. It is quite possible, however, that these variations may exist within specific limits.

Cymatodera decipiens, n. sp.—Allied to *puncticollis*, from which it differs most conspicuously by the larger size and fine series of elytral punctures, the interstriæ being from two to three times as wide as the punctures near the base, the latter nearly disappearing at about the middle of the elytra near the suture, but extending further at the sides. The antennæ are not or scarcely incrassate apically, the outer joints a little compressed and plainly subtriangular, when viewed on the compressed side, last joint longer and acutely pointed. Prothorax closely, rather coarsely but somewhat vaguely punctate. Elytral fascia incomplete, consisting of a somewhat irregular transverse antemedian spot, which reaches neither suture nor side margin. Colour piceous brown, legs and antennæ pale reddish brown ; pubescence very fine, consisting of shorter, more or less inclined hairs, with sparser, longer, erect hairs intermixed.

Length, 6.25 mm.

Male.—Fifth ventral broadly, feebly arcuate, sixth broadly, slightly arcuately emarginate at middle ; last dorsal not visible.

Female.—As in *puncticollis*.

Described from a single pair taken by the writer in the San Bernardino Mts., California.

A specimen of this species sent long ago to Dr. Horn was identified by him as *puncticollis*, but a careful study convinces me that it cannot possibly be that species. It is evidently allied to *uniformis*, Schaef, which, however, is a much more coarsely punctured and pubescent species, with immaculate elytra.

Cymotodera umbrina, n. sp.—Closely related in size, form and colour to *morosa* and *Belfragei*, with the latter of which it agrees more nearly in abdominal sexual characters. In *Belfragei* the prothorax is said to be very feebly punctured in posterior three-fourths. In the present species the prothorax is equally punctured throughout, and the elytral punctures are

finer than in *Belfragei*. The fifth ventral segment (♂) is deeply subparabolically emarginate; the sixth segment much longer than wide, slightly narrowed to apex, which is broadly, not very deeply arcuately emarginate, the lateral angles moderately acute, but not produced or incurved, their points bent downward; lateral carinæ very feebly arcuate, and only slightly convergent anteriorly, nearly reaching the base of the segment, the surface between them rather coarsely punctate and subcarinate throughout along the median line. Last dorsal notched at middle, the sides rounded; penultimate dorsal broadly, deeply triangularly emarginate. Female as in *Belfragei*.

Length, 11–13 mm.

The type is a male from Claremont, California, collected by Baker. With this I have placed a second male collected by Schwarz at Oracle, Arizona, and females from Pomona, Riverside, Echo Mt., and San Jacinto Mt., in Southern California, and Harqua Hala, in South-western Arizona.

The elytral band is almost exactly at the middle of the elytra; it is very narrow on the disk, widening a little at the margin, and is frequently obscure or visible only at sides. In *Belfragei* the sixth ventral is nearly square, a little wider toward the apex, the lateral carinæ shorter and more convergent.

Hydnocera plagifera, n. sp.—Very robust, black, slightly aeneous, and moderately shining; elytra each with a broad reddish-yellow stripe of uneven width extending from the base to apical two-fifths, touching the base and side margin, but not reaching the suture, the tips of the humeri dark. Pubescence moderately plentiful, erect and subrecumbent, white, mixed with black, and with a denser transverse fascia of white hairs covering the dilated posterior end of the pale stripe. Antennæ pale yellow; eyes moderately large; head densely, not coarsely, punctate. Prothorax distinctly wider than long, nearly as wide as the head, including the eyes, sides strongly dilated before the middle, straight and parallel in apical two-fifths; strongly impressed along the basal margin; disk evenly convex, median line smooth posteriorly, becoming evanescent in front, elsewhere closely but not coarsely punctate, the sculpture becoming somewhat rugulose laterally. Elytra covering the abdomen, plainly wider than the head, almost three-fifths as wide as long, punctuation coarse and rather dense; apices impressed before the margins, which are serrulate

and separately rounded. Beneath rather sparsely punctate and pubescent; legs black, the front tibiæ and all the tarsi pale.

Length, 5 mm.

Bishop (Owens Valley), California.

The type is a female kindly given me by Dr. Fenyes, in whose collection is a second example, which differs from the type in that the pale elytral spots involve the entire basal three-fifths of the elytra except the tips of the humeral umbones and a narrow sutural line. This was, when taken, supposed to be *robusta*, which occurs in the same region, but a comparison with Horn's description shows too many differences to permit its assignment to that species.

Hydnocera cyanitincta, n. sp.—Slender, eyes very prominent, colour above deep blue, body below and legs black, with greenish-blue reflections, the front tibiæ pale internally ; pubescence sparse, whitish, with a very faint indication of a median transverse fascia. Head finely, sparsely punctate ; prothorax sparsely, quite coarsely, but very vaguely so ; the lateral foveæ strong ; elytra coarsely, closely punctured. Elytra parallel, covering the abdomen, apices separately rounded, but not at all dehiscent.

Length, 4.8 mm.

New Mexico, Sacramento Mts. (Knaus).

Closely allied to *cyanescens*, from which it differs in a number of minor respects, which in the aggregate seem to warrant its separation. As compared with *cyanescens*, the sculpture is rather coarser and closer, prothorax is a little more transverse, the dilation more abrupt, the sides posteriorly convergent to base rather than parallel ; the elytral apices and side margins more strongly serrate.

Hydnocera cribripennis, n. sp.—Form and size of *scabra*, dull black, rather plentifully pubescent with yellowish-gray subrecumbent confused hair, and sparser blackish and pale erect hairs. Elytra with a subbasal transverse pale fascia, which crosses the suture but does not reach the side margins, and a transverse, slightly post-median spot on each, which reaches neither suture nor margin ; the extreme base is also narrowly pale on either side of the scutellum. Eyes large and strongly convex ; head densely, rather finely punctate. Prothorax much narrower than the head, a little wider than long, sides strongly rounded anteriorly, apical constriction strong, sides sinuately narrowing behind, surface densely, not coarsely punctate, and slightly rugulose, the sculpture obscured somewhat by the pubescence. Elytra not covering the abdomen, one-fifth wider than the

head, much less than twice as long as wide, sides plainly convergent posteriorly, apices separately rounded and serrulate, surface very densely, coarsely punctate, becoming strongly cribrate toward the apex. The pubescence is somewhat condensed, and transversely inclined on the posterior pale spot. Legs rufotestaceous, the thighs all more or less infuscate.

Length, 3.5 mm.

Fedor, Texas. One male.

A specimen in the LeConte cabinet bears the manuscript name, *granipennis*, which I have changed to the more appropriate one here given. The sculpture of the elytra is rougher than in any other species known to me, but is nearly approached by *Knausii*, which, however, differs much in its coloration, more slender form, less densely punctured thorax and sparser vestiture.

Hydnocera affiliata, n. sp.—Similar in form and colour to *pallipennis*, to which it is very closely related, differing only as follows: Head and prothorax closely punctate and feebly shining (sparsely punctate and shining in *pallipennis*), elytral punctures a little closer, the apex always pale, and usually with a small antiapical black spot.

California (Pasadena and Pomona).

Hydnocera sobrina, n. sp.—Slender, shining, black, with faint aeneous tinge, front and middle legs pale, hind legs black, the knees and tarsi pale; pubescence sparse, erect, uniformly distributed, ochreo-cinereous. Head finely but distinctly, not closely punctate, eyes not very prominent; antennæ pale, the tip of the terminal joint darker. Prothorax fully as long as wide, anterior dilatation not very strong, much as in *verticalis*, apical constriction moderate, sides parallel behind, lateral foveæ feeble; surface rather sparsely and finely punctate, median line faintly elevated for a short distance behind the anterior constriction. Elytra parallel, much shorter than the abdomen, dehiscent at apex, the tips rounded and feebly serrate, punctuation moderately strong and close, but much finer than in *verticalis*.

Length, 4 mm.

Oak Creek Canon, Arizona, July (Snow).

This is a rather inconspicuous species, which is in general form related to *verticalis*, but seems quite distinct from any of our described species.

ANOTHER GEOMETRID TANGLE.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

(Continued from page 71.)

Since the above investigation was begun, I have received, under date of Jan. 31, a letter from Mr. L. B. Prout, whose lively interest in solving these vexed problems is as great as my own, and much more unselfish. I can best show this by quoting it here, with apologies to him for so doing without permission.

"*Inequaliata*, Pack.—The British Museum possesses the example which purports (I suppose correctly) to be Packard's 'type' specimen. The labelling on it agrees with Packard's data, 'Long Island, N. Y. (H. K. Morrison),' and the Museum acquired it with Zeller's collection. It agrees with Packard's figure (Pl. IX, Fig. 20). It is a female example of the well-known European species, *Lobophora halterata*, Hufn., and as I believe no other American examples of that species are known, I can only conclude either:

"(1) That it was accidentally introduced to America by shipping or some unexplained agency, or

"(2) That some confusion as to its real origin occurred (*before* it was sent to Packard for figuring, for his figure confirms the specimen).

"In either event the name *inequaliata* must sink to *halterata*, and cannot stand for your pseudo *montanata* (Eastern), which, though fairly similar, is *abundantly distinct*.

"*Nivigerata*, Walk.—You are quite right. This (according to the two type specimens) is *exactly* the thing which you send me as *montanata*, Auctt., non Pack.—Packard's Eastern, non-typical *montanata*. . . . . I may add that Warren, in arranging the Brit. Mus. Geometrides thirteen years ago, had discovered the identity of *nivigerata* with the so called *montanata*, and had merged them together."

It is fortunate that the type of *inequaliata*, Pack., is in existence, for it solves definitely this part of the difficulty, and the name must be dropped from our lists. Our eastern *Lobophora*, as I have suspected, becomes *Lobophora nivigerata*, Walk., and it follows that the species now known as *Philopsia nivigerata*, Walk., is not that species, and has never been described. I herewith describe it under the name of

Philopsia canavestita, n. sp.—Expanse, 19–22 mm.

Wing texture and covering of scales very thin; fore wings large, produced at apex, hind wings small, narrow, somewhat extended. Palpi rough scaled, dark gray. Front, collar, thorax and abdomen above dark gray and white mixed, the front a little darker, tending to brownish. Wings soiled white, sprinkled thinly but evenly with dusky scales, these darkened along costal region of fore wings and when formed into bands, which sometimes are distinct and cross the wings, but more often fade out, or are entirely wanting, as in the case of the ♀ type. The male is marked thus: a narrow curved dark gray band close to base, a pale line of ground colour of equal width, then a broad gray band, widest at costa, and slightly curved toward base at inner margin. The discal space broad and paler, sometimes transversed within discal dot by a shadowy line. Extra-discal band, two-thirds out from base, darker, with an outward angle at costa, then straight across wing, darkened at veins, succeeded by a pale space of equal width. Subterminal space dusky, often traversed midway by a row of darker dots on veins: marginal line on both wings brownish, fine and distinct. Fringes dusky. Hind wings dusky white, without markings, a shade darker toward margin. Discal dots when present minute dark brown or black, often entirely lacking. Beneath soiled white, the extra-discal line is reproduced, and crosses half way from costa on fore wings, and the pale space succeeding it above is often sharply defined by a darkening of the wing subterminally, heavier at apex, fading out half way across. An apparent continuation of the extra-discal line across hind wings, curved, parallel to margin, is found in a row of diffuse dots on veins, sometimes wanting; otherwise without markings, discal dots faint. Body beneath and legs dirty white, sprinkled with dark gray and brown scales, heavily on front pair, the others lighter. Tarsi banded with dark brown. Abdomen beneath silvery white.

Types.—♂ and ♀. Coll. R. F. Pearsall, the ♂ from Doble, Cal., the ♀ from Walter's Station, Cal., in April.

Co-types.—Coll. Dr. Wm. Barnes, of Decatur, Ills., and of Dr. Jno. B. Smith, New Brunswick, N. J.

I am indebted to Dr. Jno. B. Smith for my types, and for other valuable material from Southern Calif., and to Dr. Barnes for examples from Palo Alto and Middle Calif. Two males, so marked, are smaller, a clearer gray, with lines more distinct than southern examples.

Talledega tabulata was described by Dr. Hulst from a male labelled Alert Id., Alaska. An examination proves it to possess a hair pencil on hind tibia. This makes it a Lobophora, and it is the same, I think, with

western examples passing under that name. These I have through the kindness of Dr. Barnes, from Cartwright, Man.; Victoria, B. C.; and in my own collection from Winnipeg, Man. It varies but little from its eastern congener, yet, without a larger series, I would not venture to form at present an opinion as to its rank. I place it, therefore, in the following group, as arranged:

Lobophora inequaliata, Pack.	(European.)
Talledega montanata, Pack.	Talledega montanata, Pack. var. magnoliatoidata, Dyar. Lobophora nivigerata, Walk.
" tabulata, Hulst.	Lobophora tabulata, Hulst.
Philopsia nivigerata, Walk.	Philopsia canavestita, Pearsall.

THE BURROWS OF CICINDELA RUGIFRONS AND CICINDELA MODESTA.

BY WM. T. DAVIS. STATEN ISLAND, N. Y.

On the 24th of last September Mr. Ernest Shoemaker and I went insect-collecting along the edge of the meadow on the south side of Long Island, not far from the Brooklyn City line. We were searching particularly for *Cicindelas*, but, the day being rather cold, we did not see as many as we had expected.

While looking about on one of the dunes I noticed a *Cicindela rugifrons* disappear into a little hole. He saw me coming and retreated, for he had been looking out of his doorway. I dug the *Cicindela* out, and then looked about for other little holes of the same character, of which I found a number. They entered the earth at an angle of about 45 degrees, and were two or three inches deep. They had been made by the insects digging into the earth, and little piles of sand were at each doorway. I dug open a number of these burrows and found seven *Cicindelas*—some *rugifrons* and some *modesta*. Mr. Shoemaker also secured a number of specimens in the same way.

When we returned to the dune later in the day there were no *Cicindelas* flying, and the only specimens we saw were those we dug out of their burrows, always being guided thereto by the tell-tale little heaps of sand. The soil on this particular dune was more compact than is often the case, and the digging operations of the insects were in consequence easier to follow. *Modesta* and *rugifrons* live over winter as adults, and so, perforce, must be able to dig into the sand, only on previous occasions we had not found their little burrows, which in the instance mentioned above, seem to have been of the nature of temporary shelters.

NEW AMERICAN TINEINA.

BY AUGUST BUSCK, U. S. NAT. MUS., WASHINGTON, D. C.

The following seven species of *Tineina* were part of a large and well-preserved collection of *Microlepidoptera*, recently received for determination from *Mr. Henry Engel, Pittsburg, Pennsylvania*, who has presented the types, together with many other specimens of other species, to the U. S. National Museum.

Five of the following species have previously been collected around Washington, D. C., by the writer.

Anacampsis nonstrigella, new species.—Antennæ black, with silvery-white annulations. Labial palpi bright deep ochreous, tips of terminal joints slightly shaded with black. Eyes dark red. Face white, iridescent, gradually mixed with the darker colour of the vertex. Head and thorax dark olive brown, iridescent. Basal two-thirds of fore wings dark olive, apical part deep blackish brown, with a few golden-brown scales just before apex. Hind wings dark purplish fuscous, with dorsal cilia white. Abdomen above dark purplish brown, with each joint tipped with silvery-white, the entire body below shining straw yellow. Legs straw-coloured, with broad black bars on the exterior side.

Alar expanse, 15 mm.

Habitat: Oak Station, Pennsylvania, July. U. S. Nat. Mus. Type No. 9792.

This species is nearest to *Anacampsis tristrigella*, Walsingham, and very similar to it in size and colour, but is devoid of all the prominent white apical lines characteristic of that species.

Trichotaphe Washingtoniella, new species.—Antennæ serrate, deep blackish brown, without lighter annulations. Labial palpi with smoothly appressed thickening of the second joint, blackish brown, colour on the inner side of second joint and on the terminal joint slightly mixed with ochreous. Head and thorax dark purplish brown, face a shade lighter. Fore wings dark purplish brown; on the fold are two connected, round, velvety black blotches, the outer one extending up in the middle of the wing, and containing a few ochreous scales. At the end of the cell is a somewhat larger aggregation of ochreous scales, forming two small indistinct moon-shaped spots, separated and partly surrounded by velvety black scales. Just before apex is a transverse velvety black fascia, outwardly nearly straight and parallel with the edge of the wing, inwardly

sharply angulate, the point indistinctly connected by black scales with the second discal spot. At the base of the apical cilia is a velvety black line. Cilia concolorous with the wing. Hind wing light fuscous, darkest towards the tip. Abdomen and legs dark purplish fuscous, tips of each tarsal joint ochreous.

Alar expanse, 16 mm.

Habitat: District of Columbia; Pittsburg, Pennsylvania, June; St. Louis, Missouri, August. U. S. Nat. Mus. Type No. 9793.

The larva feeds in a narrow fold on the edge of the leaf of *Eupatoria*, sp., and pupates in a similar fold.

The species is nearest *T. juncidella*, Clemens, but larger, more broad-winged, and at once distinguished by the dark labial palpi. In this respect it resembles *T. Levisella*, Fyles, which is also quite near, but *Levisella* is a still larger species, with pointed wings, while the present has apex evenly rounded as in *juncidella*.

Trichotaphe trinotella, new species.—Antennæ dark purple, without colour-annulations. Labial palpi light ochreous. Face ochreous. Head and thorax dark brown. Fore wings dark brown, with three prominent light ochreous dots, one on the middle of the wing, another smaller one just below it on the fold, and the third and largest at the end of the cell. At the beginning of the costal cilia are a few ochreous scales. Hind wings dark fuscous, cilia a shade lighter. Abdomen dark bronzy fuscous above, under side fuscous, sprinkled with ochreous. Legs blackish externally, each joint of tarsi and the spurs tipped with ochreous.

Alar expanse, 15 mm.

Habitat: Pittsburg, Pennsylvania, May. U. S. Nat. Mus. Type No. 9794.

Quite close to *T. juncidella*, Clemens, and to *T. leuconotella*, Busck, but easily distinguished by the ornamentation.

Gelechia fondella, new species.—Antennæ dingy ochreous, with black annulations. Labial palpi whitish ochreous, sprinkled with black. Face, head and thorax whitish ochreous. Fore wings whitish ochreous, with each scale darker at the tip, and with a faint roseate tinge. Two large conspicuous black costal spots, one at basal third outwardly oblique, and the other at apical third inwardly oblique, both reaching the middle of the wing. Extreme apical part of wing dusted with black. Hind wings light ochreous fuscous. Legs whitish ochreous, with black bars and spots on the exterior side.

Alar expanse, 13–14 mm.

Habitat: Plummer's Island, Maryland; Pittsburg, Pennsylvania; June. U. S. Nat. Mus. Type No. 9795.

Nearest in general habitus and coloration to the group of *G. mediofuscella*, Clemens: *Pennsylvanica*. Dietz. etc., but quite distinct in design.

Mompha stellella, new species.—Antennæ unicoloured, dark brown. Labial palpi whitish ochreous, sprinkled with black scales, and with a black annulation just before the tip of terminal joint. Face silvery white. Head and thorax light ochreous. Fore wings light ochreous, mottled with brown and black scales, costal edge evenly mottled with black, and entire apical part of the wing sprinkled with sparse black scales, two oblique, ill-defined and indistinct shades of light brown stretch across the wing, one from the base, the other from the middle of costa. There are six tufts of raised ochreous scales in two longitudinal rows, one through the middle of the wing, the other below the fold. The central of the latter tufts, which is found just before the tornus, is the largest of them, and is terminated by and followed by intense black scales, the most conspicuous marking on the rather evenly mottled wing Abdomen ochreous, Legs ochreous, mottled with black.

Alar expanse, 11–12 mm.

Habitat: Pennsylvania, District of Columbia, August. U. S. Nat. Mus. Type No. 9796.

The larvæ feed in the base of the flowers of *Evening Primrose* (*Oenothera*, sp.). The insect has long been in the Museum collection, and was passed upon already in 1886 by *Lord Walsingham* as *Laverna*, n. sp.

It is nearest and quite similar to the other *Oenothera*-feeder, *Mompha brevivittella*, Clemens, but lacks the longitudinal black streaks on the fore wings, and is at once recognized by the black tornal patch.

Mompha Engelella, new species.—Antennæ dark purplish brown, with silvery-white tips. Labial palpi golden yellow, tip of terminal joint shaded with purple. Face, head and thorax dark purplish brown, iridescent. Basal part of fore wings concolorous with thorax, and limited outwardly by a narrow oblique fascia of bluish metallic scales, beginning just before the middle of costa, and reaching the dorsal edge at basal third. Apical fourth of the wing is of this same dark purple colour, and the intervening middle part of the wing is bright golden. On this

metallic golden part are four spots of raised scales, one large, black on the fold at the middle of the wing, another smaller one above it in the cell is white, edged with black, and at the end of the cell are two more or less confluent spots of iridescent bluish scales edged with black. Between the yellow central part of the wing and the dark apical part is a small triangular silvery-white spot. Hind wings dark purplish brown. Abdomen dark brown above, silvery white on the under side. Legs purplish brown, with the tips of the spurs and of the tarsal joints white.

Alar expanse, 9–10 mm.

Habitat : Pittsburg, Pennsylvania, May; District of Columbia, June. U. S. Nat. Mus. Type No. 9797.

It gives me pleasure to name this exquisite little insect in honour of *Mr. Henry Engel.*

The species belong to the group of small metallic *Mompha*, which contains *Schranckella*, Hübner, and *terminella*, Westwood, of Europe, and is, in fact, very nearly identical in coloration with the latter.

Rebel retains in his Cat. Eur. Lepid. the separate genus *Psacaphora* for these two species, but does not include the other metallic species as *Raschiella*, Zellar. The more logical way is to retain them all in *Mompha*, as does Meyrick in his Handbook British Lepid., though eventually this genus may profitably be divided into two groups, the one represented by these small metallic species with smooth palpi and legs, the other to include the dull-coloured species with more or less shaggy palpi and legs.

Epermenia imperialella, new species. — Antennæ ciliated, dark fuscous; basal joint reddish, with pecten. Labial palpi reddish ochreous, shaded with black exteriorly. Face, head and thorax ochreous. Fore wings light yellow, overlaid on costal and apical part with reddish ochreous. On the middle of the wing is an ill-defined broad oblique darker grayish ochreous fascia, widest at the costal edge, gradually narrowing to the dorsal edge, which it reaches at basal third; it is there continued into a dark ochreous dorsal scale tuft. The reddish coloration increases in intensity towards apex. Cilia just below apex short, then suddenly very long, giving the wing the appearance of being falcate. Cilia reddish ochreous, with a marginal black line below and around apex, and with a white space outside this line, just below apex. Hind wings dark bronzy fuscous; cilia ochreous. Abdomen ochreous. Legs reddish.

Alar expanse, 19 mm.

Habitat: *Pittsburg, Pennsylvania*, June. U. S. Nat. Mus. Type No. 9798.

This is by far the largest and most conspicuous species of the genus known to me, totally unlike the other American species described at present, nearest to *E. Illigerella*, Hübner, of Europe, but larger and more striking than that species. It has a notable colour resemblance to *Gracilaria Murtfeldtella*, Busck.

THE TYPE OF THE GENUS COCCUS.

BY MRS. M. E. FERNALD, AMHERST, MASS.

In the CANADIAN ENTOMOLOGIST, Vol. xxxiv, page 232 (1902), I gave the reasons for adopting *hesperidum* as the type of *Coccus*, which adoption caused such radical changes in the classification of the *Coccidæ* that I am free to say I hesitated to make them in my Catalogue of the Coccidæ of the World, published in 1903. The main difficulty was to give a proper interpretation to the action of Geoffroy, in his Histoire Abrégée des Insectes, Vol. I (1762), where he removed a part of the Linnæan species from *Coccus*, and placed them in the genus *Chermes*, thus using this genus in a different sense from that of Linnæus, the original founder, and placing *adonidum*, *phalaridis* and his new species *ulmi* under *Coccus*. Of these three species only *phalaridis* was given by Linnæus under the genus *Coccus*, in his Systema Naturæ, ed. x (1758), and no one has ever been able to positively identify this insect. Linnæus himself was not able to determine whether it was a *Coccus*, an *Aphis* or a *Chermes*. Under these circumstances, it did not seem wise to make use of the restriction of Geoffroy, but I adopted the type established in the next oldest work known to me at that time, which was *hesperidum*, fixed as the type of *Coccus* by Latreille in his Hist. Nat. Crust. Ins., Vol. iii, page 267 (1802).

Mr. G. W. Kirkaldy, who has given us some exceedingly valuable Biographical and Nomenclatural Notes on the Hemiptera in "The Entomologist," Vol. xxxvii, p. 254 (1904), objects to the use of *hesperidum* as the type of *Coccus*, and states that he cannot find that the type of *Coccus* has ever been fixed, or that any species but the true Linnæan *cacti* is available.

I have now before me a copy of Sulzer's Die Kennzeichen der Insekten, published in 1761. In this work Sulzer gives, for those times, a

remarkably good account of the genus *Coccus*, and establishes *hesperidum* as the type, it being the only species named, giving coloured illustrations of this species on Plate xii, figs. 81, i,–o, with coloured figures of the upper and under side of the female, natural size and enlarged; the under side of a mature female, enlarged, showing the eggs; a male and female mating, enlarged, and a twig of an orange tree with the females on the leaves. I cannot find that any work appeared between 1758, when Linnæus published his genus *Coccus*, and 1761, when Sulzer established the type of *Coccus* as *hesperidum*, that would in any way affect the type of this genus. As this work of Sulzer antedates that of Geoffroy by one year, I think that *hesperidum*, Linn., must be regarded as the type of *Coccus*, according to Article 30, of the International Rules of Zoological Nomenclature (1905).

I am greatly obliged to Mr. Kirkaldy for calling my attention to errors and omissions in my Catalogue of the Coccidæ, and these will be noted in a Supplement which will be published later.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

British Columbia Branch.

The Fifth Annual Meeting was held at the Queen's School, Vancouver, on Friday, January 19th, 1906.

Present: Messrs. Dashwood-Jones, Bush, Sherman, Harvey, Marrion, Towler, Draper, and Foster.

The minutes of the last meeting were read and passed, also the balance sheet, showing a balance of 40c. cash, and supplies valued at $15.10.

Messrs. J. Anderson (Victoria) and Fred Foster (Vancouver) were elected members of the Society.

It was suggested that the spring meeting should be held at Duncan's, if possible, on or about April 17th.

The retiring officers for 1905 were re-elected for the ensuing year, viz: President, Rev. G. W. Taylor; Vice-President, Mr. T. Wilson; Secretary-Treasurer, Mr. R. V. Harvey.

The Secretary announced that he had approached the Department of Agriculture with a view to obtaining assistance towards printing a small periodical giving an account of the proceedings and work of the Society, new records, lists of B. C. insects, and articles on systematic and economic entomology. He read a letter from Mr. Tatlow, promising definite assistance.

The meeting expressed entire approval of the scheme, and a resolution was passed, proposed by Mr. Dashwood-Jones, seconded by Mr. Sherman, "That the offer of Mr. Tatlow be accepted, with the thanks of the Society, and that a committee be appointed, consisting of the President and Secretary, to arrange for the publication of a pamphlet, in such form and at such times as they may think best, and they are hereby empowered to act in the matter."

Further suggestions were made, *e. g.*, that the paper be called the "Bulletin of the B. C. Entomological Society," and that space be given in each issue to articles of interest to the fruit-growers of the Province.

Mr. Dashwood-Jones showed some very interesting specimens of Lepidoptera from St. Leon Hot Springs, Kootenay Lake, identified by Dr. Fletcher, including *Lycæna lygdamus* (new to B. C.), *Basilarchia arthemis* (new to B. C.), *B. disippus* (rare), *Erebus odora* (rare), *Sthenopis quadriguttatus* (new to B. C.), *Catocala briseis, Phengommatæa Edwardsata*, and others.

Toronto Branch.

The Toronto Branch of the Entomological Society meets in the Provincial Museum on the 3rd Tuesday of each month. The last meeting was devoted to an exhibition of specimens, and proved most interesting.

Mr. Hahn showed a collection of very beautiful butterflies from India, arranged mostly from an artistic and decorative standpoint. Some from the Fiji Islands were donated to the Society.

Mr. Elliott showed a section of a tree-trunk which had been tunnelled by the larvæ of wood-boring beetles, genus Monohammus. The tunnels had subsequently been utilized as a nursery by *Megachile brevis*, a leaf-cutting bee belonging to the family Andrenidæ. This bee had constructed its nursery-cells of rose-leaves.

Mr. Elliott also showed a larva of a moth found in New Zealand, which had become a fungus. The larva, on going into the ground to pupate, is attacked by a parasitic fungus which takes root in the body, and sends a shoot about nine inches long above ground. When the whole thing is converted into a fungus the natives use it as a food.

A pupa-case of *Vanessa antiopa*, taken in the fall, was shown. A number of small parasites were emerging.

Dr. Brodie showed a number of cases belonging to the museum, containing specimens of Cicindelidæ, Cerambycidæ and Chrysomelidæ, including all species of these families found in the neighbourhood of Toronto.

Prof. Sherman, from Guelph, was present, and gave a short talk on the work being done at the Agricultural College. A general discussion followed on methods of preserving specimens, and the need of good, well-represented collections. ELSIE BLACKMORE, Secy.

GUELPH BRANCH.

The seventh regular meeting of the Guelph Branch was held in the Agricultural College on Wednesday evening, Feb. 7th, 1906, with 14 members and three visitors in attendance.

Prof. Sherman gave a very interesting talk on the Tiger Beetles (Cicindelidæ). He showed clearly by illustration how they are distinguished from closely-allied insects, such as the Ground Beetles, etc. He also described very minutely their habits and life-histories, and exhibited a large number of specimens collected from Ontario and foreign countries. Only 11 species have been recorded in Ontario.

Mr. T. J. Moore presented notes on a large green species of Cockroach. The specimen was found in a crate of oranges imported from California.

Mr. H. R. Macmillan made a very careful review of the current literature.

The eighth regular meeting was held in the College on Wednesday evening, Feb. 21st, 1906, with 11 members in attendance.

Mr. Hart discussed trap lanterns. He exhibited and illustrated several types of lanterns, and enumerated the various kinds of insects attracted by light. The experiments conducted at Cornell University and the Agricultural College, Guelph, were carefully reviewed.

Mr. T. D. Jarvis exhibited and described an apparatus he had made for catching small Arthropods; it is a modification of the one invented by Dr. Berlese, of Italy. It has given excellent results.

Mr. G. E. Sanders discussed beneficial parasitic insects, of which he has made some very careful observations, and he presented some interesting work at the meeting. TENNYSON D. JARVIS, Secretary.

NOTES ON CULEX SQUAMIGER, COQ., WITH DESCRIPTION OF A CLOSELY-ALLIED SPECIES.

BY JOHN A. GROSSBECK, NEW BRUNSWICK, N. J.

In a recent number of this journal* Mr. Quayle gives some notes on the habits of the Californian *Culex squamiger*, Coq., and compares these briefly with those of a species occurring in New Jersey which we have been calling *squamiger* (following a determination by Mr. Coquillett), and suggests the possibility of there being two forms. The identification of our species with the Californian one has been doubted by Prof. Smith and myself since we learned of the salt-water habit of the latter; but not until Mr. Quayle pointed out the difference in the length of tracheal gills of the larva was a close comparison of the species made. This I was able to do through the kindness of Mr. Quayle, who some time ago sent Prof. Smith, among other specimens, a male and female *squamiger*, and also several larvæ supposed to be of this species. The larvæ, it turns out, cannot be differentiated from *Culex Curriei*, which species I believe them to be. Should they, however, eventually prove to be the true *squamiger*, then some of the characters are greatly at variance with our species.

The adult New Jersey form may be characterized as follows:

Culex sylvicola, n. sp.— ♀. Length, 6–7 mm. Head brown, occiput clothed with whitish scales and a patch of brown ones on each side of the median line contiguous to the eyes; antennæ brown, the basal joint and two following ones ochreous; proboscis and palpi blackish-brown, slightly sprinkled with white scales, the latter with the third joint rather long, the apical one minute, rounded, white scaled. The dorsum of the mesonotum is covered with cinereous scales, and a broad, median, dark brown vitta extends forward from the posterior margin, which becomes narrow anteriorly and golden-brown in colour; two other dark brown marks extend from the posterior margin not quite to the middle of the mesonotum, separated from the median vitta by a narrow line; scutellum cinereous, with brown bristles on the posterior margin; metanotum evenly brown; pleura brown, with dense, fluffy patches of whitish scales; halteres yellowish, tipped with brown and white. Abdomen blackish-brown above, with a few whitish scales intermixed; segments one to five have each a broad yellowish white band at the base, segments six and seven with an additional narrow apical band; beneath it is dirty white,

*CAN. ENT., Vol. XXXVIII, p. 27.

with a few brown scales ; genitalia brown. Legs dark brown, femora and tibiæ profusely sprinkled with whitish scales, the former yellowish on the posterior portion and at the knees ; claws uniserrated ; wings hyaline, the veins covered with broad brown and white scales, and also some narrow brown ones on the apical third, petiole of first submarginal cell almost two-thirds the length of this cell.

♂.—Palpi dark brown, the first joint whitish at the base, and with a yellow band in the centre ; bases of the two terminal joints also whitish in some specimens ; fan-like tufts brown, with yellow reflections. Abdomen with the bands restricted in the centre ; claws uniserrated ; petiole of first submarginal cell almost as long as this cell.

Genitalia : Clasp elongate, inner margin rounded apically ; subapical lobe present, prominent, projecting laterally, setose ; basal lobe well developed, setose, a long spine arising near it, which is curved at the tip ; clasp filament long, curved, two small setæ near the apex, with long apical spine. Harpe jointed, basal segment curved, swollen basally ; apical segment long, dilated centrally, tip curved. Harpago hood-shaped, tip bent laterally. Appendage of eighth segment with long setæ. (Fig. 11.)

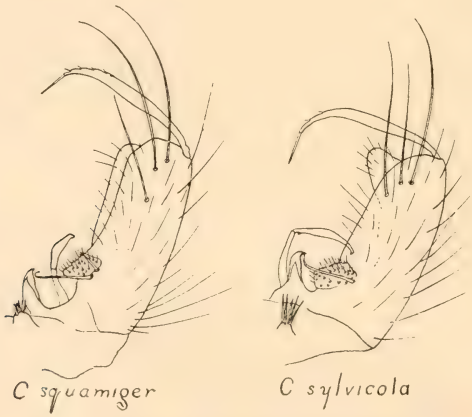

Fig. 11.—Genitalia of Culex squamiger and sylvicola.

Besides the great differences in the genitalia, *sylvicola* may be further distinguished from *squamiger* by the presence of the cinereous scales on the mesonotum ; by the proboscis being uniformly almost black instead of pale brown, and by the much darker colour of the femora and tibiæ.

Described from 21 males and 20 females in the New Jersey Experiment Station collection.

Habitat: Livingston Park (near New Brunswick), N. J., and Westville, N. J.

This species was first taken in New Jersey, near Paterson, in April, 1903, in the larval condition; but no adults were bred therefrom. In the following spring they were again met with in Livingston Park, and in the season of 1905 they were secured from this locality in some numbers. They were found full-grown as early as April 28th—indicating an egg hibernation—and the last were taken not later than May 17th, though frequent subsequent collections were made. No larvæ were ever taken in any but fresh water, woodland pools; and adults were never seen outside their immediate breeding grounds. After emergence they continue on the wing for a period of about three months, becoming more and more worn as the season advances.

An account of the life-history of this species as far as known, and a description of both larva and adult, is given by Prof. Smith in his "Report on Mosquitoes" (N. J. State Exper. Sta., 1903–'04), and also a description of the larva in Psyche, Vol. XII, p. 13.

A description of the genitalia of *C. squamiger* is here appended for comparison with *C. sylvicola* (Fig. 11): Clasp elongate, margins subparallel almost to apex, inner margin rounding abruptly toward apex; subapical lobe setose; basal lobe well developed, setose, a long spine recurved at the tip arising near it, another stout spine a short distance above this; clasp filament long, curved, four small setæ near the apex, with long apical spine. Harpe jointed, basal segment comparatively short, apical segment short, dilated centrally, tip slightly curved. Harpago hood-shaped, tip bent laterally. Appendage of eighth segment with short setæ.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

This institution, founded in 1856, celebrated its first jubilee by a dinner on Saturday evening, March 10th. About 200 persons were present, including a number of representatives of societies at a distance. The Entomological Society of Ontario was well represented by one of its ex-presidents, Prof. Lochhead, of Guelph, who conveyed the cordial greetings of this Society to the members of the Academy. In commemoration of the interesting event a handsome bronze medal has been prepared, having on the obverse a portrait of George Engelmann, the first president. The Curator desires to express his hearty thanks for the one presented to our Society.

MOSQUITO NOTES.—No. 4. (Continued.)

BY C. S. LUDLOW, M. SC.

Laboratory of the Office of the Surgeon-General, U. S. Army, Washington, D. C.

The "confusion worse confounded" in which the mosquitoes of America are at present enveloped may be illustrated by the two following instances:

In the August number, CANADIAN ENTOMOLOGIST (1904) I described a mosquito from Benecia, Cal., as *Grabhamia de Neidmannii*, and, some time afterward, received a note from Mr. Coquillett, stating he believed it to be his *Culex squamiger* (originally published as *Tæniorhynchus*). As the insect did not belong to *Culex*, as restricted by Theobald, and I had not seen Mr. Coquillett's description, I let the matter rest till I should have further information. Now, for some time, I have been practically convinced that Mr. Coquillett was correct, and that *Grabhamia de Neidmannii* must sink as a synonym of his *squamiger*, the genus of which seems, however, to be still undetermined, Mr. Coquillett now referring it to *Culex*, Dr. Dyar to *Grabhamia*, and Dr. Felt to *Culicida*.

In June, 1905, in this magazine I described another mosquito (from the Sierra Nevada Mts.) as *Tæniorhynchus Sierrensis*, the description being made from several very imperfect specimens. During the fall of 1905 some specimens in good condition were received, and to my astonishment I found that, partly from an error in transcribing my original notes, partly from the poor condition of the specimens, not only had a gross error in the description of the tarsi arisen, but that the scales of the scutellum, which are long, very broadly spatulate, and only slightly curved, with a few slender curved scales, apparently mostly at the base of the scutellum, carried it out of *Tæniorhynchus*. The description as to colours, etc., as now corrected, makes it more than probable that it is Coquillett's *varipalpus*, but if this be so, it is in any case *not* a *Culex*, nor a *Tæniorhynchus*, but probably lies near *Finlaya*.

The following is apparently a new mosquito, being one of the very few in the U. S. having light apical abdominal markings:

Culex Frickii, n. sp.—Female: Head covered with pale ochraceous, almost white scales, long curved ones, heavily intermingled with dark brown forked scales on the occiput and vertex, flat lateral scales, light around the eyes, with a few dark bristles projecting forward; antennæ brown, verticels and pubescence brown, first joint with a few light scales, basal joint covered with "frost" and a few white scales; palpi dark brown,

distal joint small; proboscis brown; clypeus brown, with "frost"; eyes dark brown.

Thorax brown; prothoracic lobes covered with pale ochraceous scales and dark brown bristles; mesonotum with narrow curved dark brown scales, a golden-brown in some lights, a few pale ochraceous ones hardly forming a line on the lateral margins and an arch of them surrounding the "bare space," two submedian bare lines from cephalic end nearly to "bare space" covered with "frost," so that they seem like two very fine but distinct white lines; scutellum brown, with pale ochraceous curved scales and large brown bristles; pleura covered with white "frost" and having a couple of large bunches of white, flat spatulate scales; metanotum brown.

Abdomen brown, covered with rather broad flat scales, tending to iridescence, narrow white apical bands, and white apical lateral spots continuous with the scaling of the venter, which is white; white apical hairs. On the last segment the apical band becomes much diminished on the median line, possibly sometimes broken so as to form two spots.

Legs as a whole brown; coxæ and trochanters light and nearly naked, but showing the white "frost"; femora light at base and on ventral aspect, a small light knee-spot minutely involving both sides of the joint; tibia brown, a minute apical light spot involving both sides of the joint, remainder of tarsi all brown; all ungues small, equal, and simple.

The colouring as a whole is dark, but the scales are very sensitive to the position of the light, and on the legs it is almost impossible to determine if there be a very narrow light line on the ventral aspect of the tibia or not, for in some lights it is not apparent, and in others it appears present. The mesothorax shows the same trait, in that the tips of the scales become golden-brown, and are thus very misleading.

Wings clear; scales brown, slender, covering the distal half of wing rather heavily; cells vary somewhat in the two wings, first submarginal about a third longer and nearly the same width as second posterior, the stem of the former about a fourth the length of its cell, of the latter a little more than half the cell's length; supernumerary and mid about the same length and meet, posterior cross-vein slightly shorter and three times its length distant. Halteres light, a few brown scales on the distal parts of stem.

Length, 4 mm. Habitat, Fort Snelling, Minn. Taken Oct. 1.

Collected and sent by Major E. B. Frick, Surg. U. S. Army, after whom it is named.

It lies very near *territans*, but differs in general colouring, in the "frosty" sub-median lines on the mesonotum, the light scales around the "bare space," light scales on the scutellum, the much better developed apical abdominal bands, white bases and venter of femora, and the minute spot at apex of tibia.

In the Entomological News, Nov., 1905, Prof. Glenn W. Herrick, Agricultural College, Miss., published some *notes on a *Megarhinus*, describing and figuring the larva, and making mention of some characteristics of the three adults which he reared from the larvæ. Prof. Herrick's specimens were referred to *M. Portoricensis*, Theob., but they differ from this species (1) in the length of a palpal joint, usually a stable feature, Theobald's having the penultimate as long as the ultimate, and Herrick's having the penultimate only half as long as the ultimate; (2) in the colour of the head, Theobald's being brown, and Herrick's specimens "bluish-green, (iridescent)"; (3) in the tarsal banding, Theobald's species having the penultimate joint of the hind legs "white, except a small dark *basal* spot," and the same joint in Herrick's specimens being "white, except a black ring at the *distal* ends." As these differences seem specific, I was about to give here a full description of the insect, and to propose that it should be named in honour of the discoverer, but since my MS. was sent in for publication I have learnt that Mr. Theobald is describing and naming it, and therefore I refrain from doing so.

ACKNOWLEDGMENTS.

The Curator begs to acknowledge with grateful thanks the gift to the Society's collections of 24 specimens, representing 11 species, of Lepidoptera by Mr. Henry S. Saunders, of Toronto.

Also a box of Coleoptera from Mr. Norman Criddle, of Aweme, Manitoba, containing 120 specimens, representing 64 species, many not previously recorded in Canada, and all new to our collections.

Hearty thanks are due also to Mr. Henry H. Lyman, of Montreal, for photographs of the late Messrs George J. Bowles and F. B. Caulfield, who were active and zealous members of the Montreal Branch in years gone by. These portraits were only procured by Mr. Lyman after considerable trouble and search. Further additions to the Society's albums will be very welcome.

* "Notes on Some Mississippi Mosquitoes."

CATALOGUE OF THE GENERA OF THE HEMIPTEROUS FAMILY APHIDÆ.—SUPPLEMENT.

BY G. W. KIRKALDY, HONOLULU.

My friend, Prof. T. D. A. Cockerell, has indicated some omissions in the above Catalogue, which I have verified. Those marked * are not recorded in the "Zoological Record," and I had not seen the works till Prof. Cockerell called my attention to them.

Genus 1.—*Macrosiphum.*

191. *Coweni*, Hunter, 1901, Bull. Iowa Agr. Sta., 60, p. 114.
[n. n. for || *artemisiæ*, Cowen, No. 2.]

Gen. 10.—*Myzus.*

192. *fragæfolii*, Cockerell, 1901, CANAD. ENT., XXXIII, 101.
193. *Neomexicanus*, W. P. and T. D. A. Cockerell, l. c., 227.
194. *Pergandii*, Sanderson, l. c., 72, Pl. 3, fig. 10; text fig. 5.
*195. *porosus*, Sanderson, 1900, Twelfth Rep. Delaware Agr. Sta., pp. 205–6; fig. 10, p. 191.

Gen. 13.—*Aphis.*

*196. *brevis*, Sanderson, 1901, Thirteenth Rep. Delaware Agr. Sta., pp. 129, 157–158, figs. 26 and 27.
*197. *Fitchii*, Sanderson, l. c., pp. 128, 137–149, figs. 15–21.

Gen. 47.—*Byrsocrypta.*

198. *Coweni* (*P.*), Cockerell, 1905, CAN. ENT., XXXVII, 392.

I have also omitted a new var. of *Macrosiphum artemisiæ*, viz.:

199. *citrinum*, Schouteden, 1901, Ann. S. E. Belg., XLV, 117.

Prof. Cockerell writes that in his table in Psyche, 1903, p. 218, *Tychea lasii* and *pallidula* are transposed, though the detailed descriptions are correct.

N. B.—*Aphis alamedensis* (No. 53) is spelt *alemedensis* on p. 251 in the detailed description, and so spelt in the "Zoological Record"; in the table (p. 249) it is "Alamedensis." *Cryptosiphum nerii* (No. 108) is a synonym of *Myzus asclepiadis.*

Lachnus viridescens (described as var. of *piceicola*) is recorded incorrectly in the "Bericht der Entom., under *Chermes.*

ERRATA.—Page 47, line 13, for "these species" read "three species." Page 101, lines 24 and 28, for "*Eupithecia multiscripta*, Hulst," read "*Eupithecia multistrigata*, Hulst."

April, 1906.

A NEW ROACH FROM THE PHILIPPINES.

BY A. N. CAUDELL, WASHINGTON, D. C.

Salganea humeralis, new species.—Size medium. General colour black, the under surface of the legs and of the body, except the last abdominal segment, or subgenital plate, and the mouth, except the mandibles, and also the vertex, reddish. The base of the elytra in the anal field is also tinted with reddish. Antennæ dark, hairy. Wings and elytra mostly missing. Anterior femora unarmed. Pronotum very slightly notched anteriorly, the disk with the usual irregular V-shaped depression and unequal elevations, but not distinctly tuberculate, the entire surface punctate. Base of the elytra smooth in the anal field, the costal field densely and coarsely punctate. Abdomen punctured, finer below along the median line, the segments transversely sulcate anteriorly above, more profoundly so towards the sides of the last three ; seventh segment laterally irregularly crenulate, the latero-posterior angles divergent. Supra-anal plate rugulosely punctate, the posterior margin dully serrate ; subgenital plate marked as the supra-anal plate, posteriorly emarginate. Cerci short, triangular, hairy, reddish in colour.

Length, 30 mm. ; pronotum, 7.5 mm. ; width, pronotum, 11 mm. ; abdomen, 14 mm.

Type No. 9812, U.S.N.M.

One female, one nymph, received from C.S. Banks, of Manilla, P.I.; no definite locality given.

This species seems to be the most nearly allied to *Salganea rugulata* of Saussure, but is decidedly larger than that species. The organs of flight are much mutilated, as is so often the case with members of this genus, as well as *Panesthia*, and probably other related genera. The elytra and wings are apparently chewed off, and so uniformly as to appear like a short-winged form, if not carefully examined. Of the three species of *Salganea* and *Panesthia* examined by me, more than one half of the specimens are thus mutilated. I can assign no plausible cause for the phenomenon.

The nymph is reddish yellow, lighter below, except towards the tip of the abdomen. The punctures of the surface are not so deep nor distinct as in the adult.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 12.

Winter Retreats of Insects.

BY REV. THOMAS W. FYLES, LEVIS, QUEBEC.

Occasionally, after a mild day or two in winter, we see a newspaper paragraph headed "Remarkable Appearance of a Butterfly." From the tone of the article we usually judge that the writer had been lost in astonishment, at what he regarded as a strange phenomenon. This short paper will rob such appearances of their mystery.

Many insects pass the winter in the egg-stage, such as *Orgyia antiqua*, Linneus, and *Orgyia leucostigma*, Smith and Abbot. With such we have not now to deal. Others pass the dreary months in (1) the Larval, (2) in the Pupal, or (3) in the Imago stage of their existence.

(1) Of insects that pass the winter in the larval condition, those of the beautiful butterflies *Melitæa Phaeton*, Drury, and *Melitæa Harrisii*, Scudder, weave webs upon their food-plants, and dwell in companies. I have found the former on Turtle Head, *Chelone glabra*, in bottom-lands, in the township of Brome, and the latter on the White Aster, *Diplopappus umbellatus*, in the Fort Woods at Levis. The larvæ go into a torpid state after the third moult. They scatter and feed up in the spring.

Other larvæ pass the winter in solitary, sullen independence. A familiar instance of such is afforded by the bristly, black and red caterpillar of the Isabella Tiger Moth, *Isia Isabella*, Smith and Abbot, (Fig. 12). This is often found curled up hedge-hog fashion, among the chips in a neglected corner of the wood-shed; under the buckets piled in the sugar-shanty; or under loose planks in the hay-barn. It creeps into any convenient shelter.

In the spring the black larvæ of the Virgin Tiger Moth, *Apantesis virgo*, Linneus, may sometimes be seen crawling from a sidewalk, under the planking of which they had found a winter retreat.

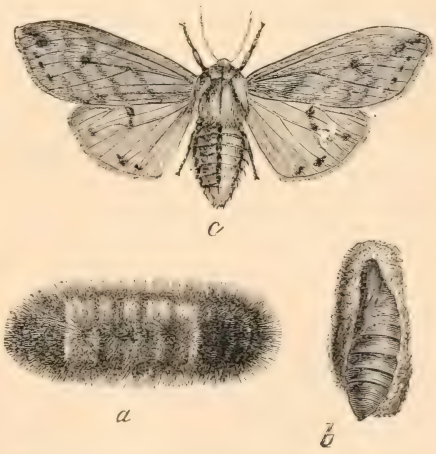

Fig 12.—Isia Isabella. *a*, caterpillar. *b*, chrysalis, *c*, moth.

April, 1906.

Piles of boards, loose bark, hollow trees, hay and straw stacked in the fields, afford comfortable quarters for hibernating larvæ.

In the first mild days of opening spring I have seen caterpillars of the American Ruby Tiger, *Phragmatobia fuliginosa*, Linneus, walking over the snow, to find bare spots in which Dandelion and Plantain begin to appear; and I have found, here and there in the woods, on early tufts of wild grass, those of the Purple Lapwing, *Ctenucha Virginica*, Charpentier, making up for their long fast.

(2) But a very large proportion of the insect tribes, on the approach of winter, undergo the pupal change.

(a) Some suspend themselves, and change to naked chrysalids.
(b) Others bury themselves in the earth.
(c) And others spin for themselves snug cocoons.

All of them search for suitable quarters before they undergo the important change.

(a) A ready example of this class is afforded by the caterpillar of the Cabbage Butterfly, *Pieris rapæ*, Linneus. The full-fed larva of the late brood of this species having found a fitting situation—*sometimes in a dwelling-house*,—proceeds to fasten itself at its hind end, by means of a silken attachment, to the surface on which it rests. It then deftly passes a thread from the middle of its back to its support, and then, turning to the other side, continues this, making a perfect loop. And so it braces itself immediately before the actual change to the chrysalis takes place.

One bright day, in the winter of 1904-5, I noticed a fresh specimen of the Cabbage Butterfly fluttering in a window of an upper chamber of my house. The steady warmth of the dwelling had hastened the development of the insect. I left it, but it probably escaped through a ventilator. If it did so, and happened to come before a newspaper scribe in search of an item, what an opportunity he would have had for an interesting paragraph!

(b) Many larvæ, on attaining full-growth, bury themselves in the soil, and there undergo the pupal change. The large Hawk Moth Caterpillars do this. Take, for instance, the beautiful caterpillar of *Sphinx kalmiæ*, Smith and Abbot, which often feeds on the Syringas and Lilacs in our gardens. It may be known by its blue, anal horn covered with black tubercles. This larva when full-fed, wriggles its way for some inches in

the earth, and then doubles and twists till it has formed a cyst, the wall of which is compacted by the pressure of the larva, and by moisture exuded from its body.

When house-plants are re-potted it sometimes happens that chrysalids of small moths are unwittingly potted also, and *taken into the house.*

I have two specimens of the beautiful little moth *Gluphisia trilineata*, Packard, which, at different times in the winter, issued from the soil around window-plants in my home.

(c) Many insects—among them the beautiful Saturnians—on the approach of winter, envelop themselves in wonderfully-constructed cocoons. The large, spindle-shaped cocoons of *Attacus Cecropia*, Linneus, may often be seen, high up, on twigs of apple, maple and other trees.

If you examine one of these cocoons, you will find that it consists of an outer case, stiff and compact, to shed moisture, and of an inner blanket-like wrapping, soft and warm. The way of exit is guarded from intrusion by convergent bristles.

I have some remarkable cocoons from Arizona. They are very compact and hard, gray in colour, and veined with dark brown. They have no soft blanket within—that, in a warmer climate, was unnecessary ; but they have a wonderful prolongation of the upper part, curved over, so as to form a pent-house to the opening beneath, evidently to shed the rain and keep the inmate dry. The silken band that held the cocoon to the twig proceeds from the outer extremity of this prolongation. The convergent bristles, to keep out troublesome visitors, are attached regularly to the inner surface of the cocoon, and extend but a little way within. The magnificent Saturnian that came from these cocoons is, I understand, *Attacus splendidus*, De B.

I have before me a cocoon of a Limacodes, probably *Euclea querceti*, Herrich-Schaeffer, brought from Mirand, P.Q., by Miss M. G. Johnston, a member of the Quebec Branch. It resembles a brown bean held in place by a few hairs.

(3) A large number, both of Butterflies and Moths, spend the winter in the perfect state. The hibernating butterflies belong to the genera Vanessa and Grapta. The moths are Noctuids. Of these moths, numbers may be found in the sugar season, drowned in the sap that has accumulated in the buckets during the night.

A few years ago, on the night of February 2nd, Mr. James Barclay, of Levis, captured a fine specimen of *Ufeus satyricus*, Grote, as it was flying round the station buildings of the Intercolonial Railway at Chaudiére Junction, P. Q.

Lonely barns, deserted houses, overhanging cliffs, hollow trees, evergreens, etc., afford shelter to such hibernating insects; and that any of the sleepers should be aroused and come forth, in an unusually mild time, is not more wonderful than that a squirrel, under similar circumstances, should show itself. According to the popular belief, the bear even comes forth on Candlemas Day to study the weather.

CORRESPONDENCE: A PROTEST.

SIR,—After all that has been written of the evil of having descriptions of new species scattered through journals of general natural history or transactions of societies not exclusively devoted to one branch of science, it is certainly disheartening to find in the March number of "The Ottawa Naturalist," a paper by the Rev. Geo. W. Taylor, describing a new species from Ottawa of the genus which for some ten years has been standing in our lists as *Tephroclystis*, Hubner, under the name of *Eupithecia Youngata*.

I can see very little difference between this and the description of butterflies by Mr. Wm. H. Edwards in "Field and Forest," which was so generally condemned by entomologists. Had we no Canadian journal devoted exclusively to entomology, it would, in my opinion, still be deplorable, but when we have such a journal as "THE CANADIAN ENTOMOLOGIST," it seems inexcusable, and I trust that, for the benefit of the science, you will republish the descriptive part of the paper in this journal.

HENRY H. LYMAN.

PROFESSOR JOHN B. SMITH, of Rutgers College, New Brunswick, New Jersey, is enjoying a three months' leave of absence in Europe. A postal card depicting the Bridges over the Arno revealed the fact that he was recently at Florence.

Mailed April 2nd, 1906.

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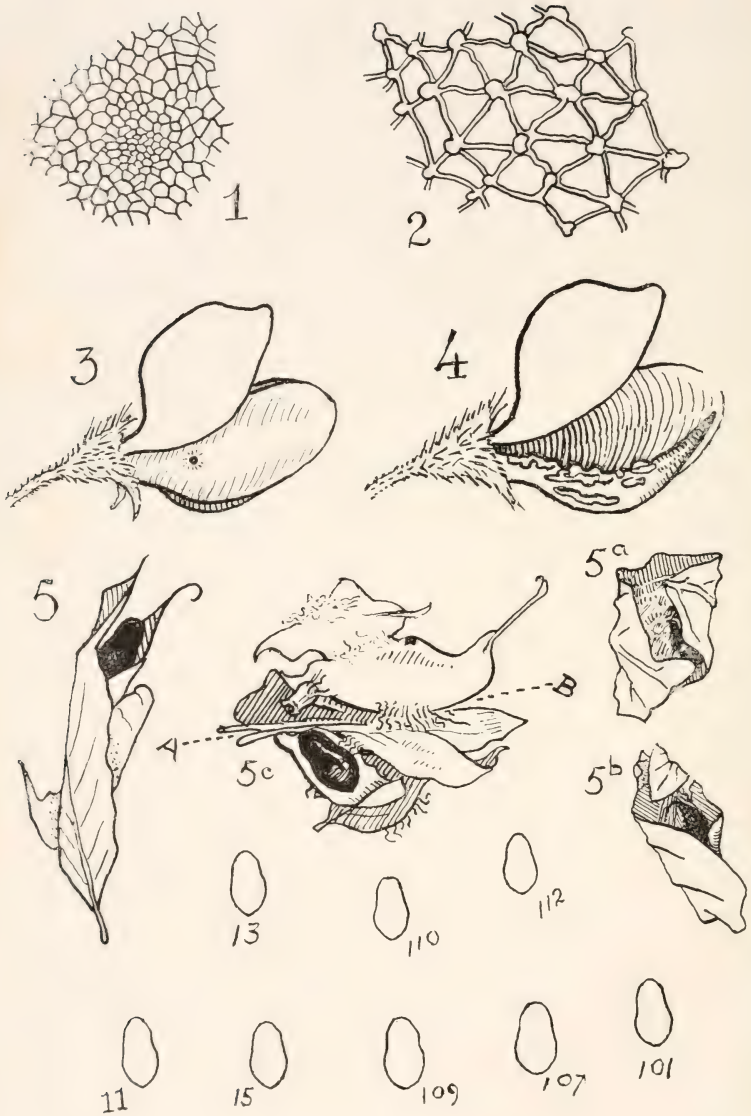

INCISALIA IRUS, GODT.

The Canadian Entomologist.

VOL. XXXVIII. LONDON, MAY, 1906. No. 5

STUDIES IN THE GENUS INCISALIA.

BY JOHN H. COOK, ALBANY, N. Y.

The genus *Incisalia* was proposed by Minot in 1872, to separate from the unwieldy genus *Thecla* those small butterflies which, on a basis of general similarity of structure in the imago, seemed to be most intimately related to Hübner's *niphon*, which stands as the type.

Ten forms referable to this genus have been described, eight of which must tentatively be regarded as good species. The *augustinus* of Westwood is now sunk as a synonym of *augustus* (Kirby), and the *arsace* of Boisduval and Le Conte is accorded varietal distinction under Godart's *irus*. All the species are confined, as far as is known, to North America, and with the exception of *Mossi* (Hy. Edwards), hitherto reported only from Vancouver Island, are found within the United States.

Niphon enjoys the widest distribution, being found on both sides of the continent, and, in the east, ranging from Canada to Georgia. *Augustus* is apparently confined to the northern part of the eastern half of the continent. It is abundant in Canada, and I have taken it as far south as Maryland. *Irus* and *Henrici* have been confused so often that the geographical distribution of neither is definitely determined. It may, however, be confidently stated that the range of *Henrici* is more restricted than that of *irus*. The latter occurs in Georgia according to Abbot (whence *Henrici* has not been reported) and is found along the Atlantic Coast States as far north as Maine, and inland at least to Ohio and Illinois. Lacking further definite information Dr. H. G. Dyar, in his recent List of North American Lepidoptera,* gives as the habitat of *Henrici* West Virginia only. This species has also been taken at Cincinnati, O. (Miss Braun), Rockland Co., N. Y. (F. E. Watson), Albany, N. Y. (J. H. Cook), Schenectady, N. Y. (Harry Cook), and Franklin, Pa. (W. T. Bell).† It doubtless occurs in other places, where it has been overlooked by collectors or confounded with *irus*.

*U. S. Nat. Mus. Bull., No. 52.

†Psyche, Vol. 8, p. 143 (Nov., 1897).

These four species, *niphon*, *augustus*, *Henrici* and *irus*, constitute the representation of the genus east of the Mississippi, and our knowledge of their life-histories is far from complete. Since all are measurably common on the glacial sand plain west of this city, I endeavoured to ascertain the food plant of each (unknown, except in the case of *niphon*) and to breed the larvæ. The study has been full of interest, and my efforts have met with success beyond my expectation.

I.—*Incisalia Irus.*

Time of flight.—Species single brooded ; the butterfly very abundant during May. It appears each year during the last week of April, and has practically disappeared by June 1st, although I have taken worn individuals as late as June 20th. Its season of greatest abundance is the end of the second week in May.

Oviposition.—Each female produces from 12 to 18 eggs,* which she places singly on the opening buds (rarely on the leaves) of the food plant, *Lupinus perennis*. The butterfly chooses the middle of the day for ovipositing, and disposes of her whole store within an hour. I have never observed a second egg placed upon any plant, except when the butterfly chanced to return to it after visiting another. One cannot readily distinguish the gravid female by her flight, for it is not heavy, but rather may be described as businesslike. She flies directly to the erect raceme, alights without preliminary fluttering, and, after walking about for a few seconds with wings closely appressed and motionless, selects a suitable spot and thrusts her horny ovipositor among and beneath the hairs which clothe the lupine. Immediately upon extruding the egg the insect flies away, occasionally covering a distance of twenty or thirty yards before again ovipositing. In consequence, it often requires a sharp eye and a lively step to follow her through the low growth. Still, it is by no means impossible, for she never leaves the open, refusing to fly through dark spots and turning aside to circle a tree rather than come under its shadow. The eggs are thus scattered over a comparatively broad area, and are to be looked for upon the racemes (usually on the calyxes) of plants exposed during the middle of the day to the full glare of the sun.

The egg.—In all, forty-two eggs were carefully examined under the microscope, and I have nothing to add to the descriptions already published. However, the figures given in Scudder's "Butterflies of the Eastern United States and Canada" seem to me to be somewhat ideal or

*Edwards secured 15 eggs from a female imprisoned over plum.

diagrammatic. In no instance did I find the raised reticulation and the bosses so regular either in outline or arrangement as there depicted. I have therefore represented in Plate 1 the micropyle (fig. 1) and a part of the surface sculpture (fig. 2) from the region of greatest diameter. These figures are reproduced from camera lucida drawings, and exhibit typical characters.

Period of incubation.—A number of eggs were secured, with the exact time of oviposition, and in each case the birth of the caterpillar was determined to within an hour or two, except when it occurred during the night. The average duration of this stage was found to be 4 days 2 hours. Two hatched after only 3 days, and several were delayed to 5 days 4 hours.

The larval stages.—In freeing itself from the eggshell the caterpillar eats only enough to permit it to escape. It bites a hole through the edge of the concave top, usually destroying the micropyle. Of all the empty shells examined, only two were found with this structure intact and suitable for drawing. The newly-born larva seeks the petals* of the flower on which it finds itself and bores a hole through them just large enough to accommodate its body. Through this it crawls into the heart of the blossom and feeds upon the stamens, pistil and carina. It is a fact worthy of note that the *alæ* and *vexillum* are not eaten, and, with the exception of the minute hole by which, as a baby, the caterpillar entered, the flower seems uninjured. Without doubt, this habit serves as a measure of protection against their ever-watchful enemies. Fig. 3 shows a flower of the lupine (x 2.25) and the small hole by which I detected the presence of many of the larvæ collected or marked for study. Around the hole the tissue dies, and is discoloured for a very little distance. Fig. 4 is the same, with one wing removed to show the riddled keel.

The first moult evidently takes place within the flower; whether the others do is doubtful. As long as the petals last the caterpillar lives within their purple shadow,† probably moving to a new home whenever the immediate supply of food has been exhausted. When this happens, the petals are not punctured, but access to the inside of the flower is gained between them. There is thus no indication of the presence of a

*The larvæ from two eggs found on leaves attacked the parenchyma of the upper surface. These were not collected, but, with others, were left for observation in the field. One of them was discovered by a small black spider, which carried it off before my eyes. The other disappeared the day after hatching, may have been killed, or sought the flowers.

†It may be merely a coincidence, but I have never found a larva on the variety *albaflora*.

larva except in its first home. The excrement is soft, wet and green when the insect has been feeding upon succulent tissues; dry, granular and coloured when the anthers have been eaten.

After the petals have withered and the pod is developed, the larvæ may be found boring into the latter and feeding openly by day. It is, however, much more difficult to find them at this time, possibly because their number is depleted.

Three moults are undergone before pupation, the caterpillar finally attaining a length of 12–16 mm. The length of larval life varies considerably, but all the insects bred were in chrysalis before the second of July.

Pupation.—When fully grown the larva grows restless and refuses to eat. For two or three days it will circle its prison time and again, noticeably decreasing in size in the meantime. When it was noticed that one desired to pupate it was transferred to a shallow glass-covered box filled with sand, over which dry leaves and twigs had been liberally sprinkled. One of the most interesting facts determined concerning this species is that the larva constructs a rude cocoon of leaves or other *debris*, fastened together with a considerable amount of silk. These "cocoons" are less finished than those of many Hesperidæ, and remind one of similar shelters constructed by *Everes comyntas*. Fig. 5 in the plate shows one made of three leaves, and scarcely covering the chrysalis; fig. 5a, one of a single leaf and much silk; fig. 5b, one of parts of two leaves and little silk; fig. 5c, the largest and firmest of all. This is composed of six leaves or parts of leaves and a withered *Vaccinium* flower, fastened by silk in five different places. This has been opened and folded back along the line A–B.

The chrysalis.—Figs. 11, 13, 15, 101, 107, 109, 110 and 112 show variation in the size and outline of the chrysalids. These are drawn natural size by tracing the shadow cast under a point of brilliant light, and are not symmetrical, because the chrysalis not being flat on the ventral surface tips a little to one side or the other; 13, 110 and 112 did not yield imagoes; 11 and 15 gave males; 101, 107 and 109 gave females.

Parasite.—A dipterous larva came out of No. 110 on February 9th, 1906, and hardened into a short cylindrical pupal case, rounded at both ends. On February 28th the fly emerged, and is evidently a Tachinid. I have referred it to the genus Exorista, but am not able to identify it further.

(To be continued.)

COLLECTING NOTES ON COLEOPTERA.

BY W. KNAUS, MCPHERSON, KANSAS.

While collecting at Brownwood, Texas, in the latter part of May, 1904, I secured half a dozen three- and four-inch sections of a Mesquite tree, about three inches in diameter, that had been cleared from land the preceding fall. The sections were infested with Coleopterous larvæ, and were put into a breeding box to see what would develop. The first transformation into imagoes was in July, when a small Ptinid, *Trogoxylon Californicum*, Lec., began to emerge in numbers. A little later three or four specimens of a small Cucujid, *Lathropus vernalis*, Lec., emerged. In August a dozen specimens of *Sinoxylon Texanum*, Horn, had transformed, their cells being in the white wood part of the Mesquite. After emergence, a number of these bored holes straight into the wood their full length, or deeper. At this time also appeared three or four Clerids, *Elasmocerus terminalis*, Say, pupating like the Sinoxylon, in the white wood near the bark. August 4 the first specimen of *Cyllene crinicornis*, Chev., emerged; two or three September 18, and two or three others the first week in October. About fifty per cent. of the larvæ of this species died before entering the pupal state. The larvæ channelled through all parts of the wood. Two or three parasitic Hymenoptera emerged up to November. The Trogoxylon continued to thrive and transform until extreme cold weather. Examinations of the wood in April and May, 1905, showed the Trogoxylon still at work in the white wood, and every examination during the summer and fall showed live and dead insects of this species.

Some time during July four more specimens of the Longicorn, *Cyllene crinicornis*, transformed, and were found dead, and two or three dead *Sinoxylon Texanum* and one *Elasmocerus terminatus*, Say, were also found.

The capture of two or three specimens of *Hilipus squamosus*, Lec., on spice wood near Galena, Kansas, by Mr. Eb. Crum, has been recorded. This fine Curculionid was described from specimens taken from under pine bark in Georgia. It has also been taken in Kentucky, but it is rather unexpected to find the species in Kansas.

Dr. G. H. Horn, in his "Halticini," 1887, describes *Crepidodera longula*, and says: "Collected at McPherson, Kansas, on Willows, by William Knaus." The Doctor was slightly in error. The type specimen was collected near Osage City, in June, 1883, by myself, and occurs from

Central Kansas east. I have taken at McPherson two or three specimens of an Epitrix that seems to be new. It is closely related to *cucumeris*, but is larger, thorax more robust, and elytra and thorax almost entirely ferruginous or testaceous.

At Alomogordo, N. M., and El Paso, Texas, the 14th to 20th of June, 1905, the common Aphodius was *pumilus*, Horn, one of the smallest in the genus. Among other things, I sent specimens of this species to Mr. Chas. Dury, of Cincinnati, Ohio. He wrote me that he was glad to see the little fellows, as he had collected the type specimen from which Dr. Horn wrote his description more than twenty years ago, about half a mile north of Las Cruces, N. M. One specimen was all he could find, and this he gave to Dr. Horn.

Aphodius larrea, Horn, is recorded as being taken by Mr. G. W. Dunn on the plant, *Larrea Mexicana*, near El Paso, Texas. I took four specimens of this Aphodius at El Paso, June 18th, 1905. They were not on *Larrea*, but were taken where Aphodius with normal appetites would be expected to be found.

Canthon vigilans, Lec., is recorded as being from Kansas, but I never saw a specimen from this State until I took a single one at McPherson. They are rare in Kansas, this State evidently being the northern limit of range.

Cœlestethus alternatus, Fall, is described by the author in his revision of the Ptinidæ, from three specimens, two of which were taken by Prof. T. D. A. Cockerell with the locality Wootens, N. M. Last June I took two specimens of this species by beating, near Cloudcroft, on the summit of the Sacramento Mountains, nine thousand feet above sea level. Wootens is down Fresnal Canon about four miles, and is two thousand feet lower in altitude.

June 14th to 17th, 1905, a new *Dichelonycha, testaceipennis*, Fall (MS.), occurred plentifully from Cloudcroft to Wootens, being easily secured by beating scrub oak, young pines and firs, wild roses and willows. I collected over the same ground two years before, and at the same time in the month, but did not see a single *Dichelonycha*.

This season I took several specimens of a fine large Embaphion, which will be described as new by Dr. F. E. Blaisdell, under the name of *contractum*, on the summit near Cloudcroft, N. M. Two seasons before I collected over the same ground on the same dates (June 12th to 17th) as this year, but did not see an Embaphion.

At Alamogordo, N. M., on the flat east of the town, I took, June 13th, 1905, along an overflow stream from an irrigation ditch, a single specimen of what I thought was *Cicindela rectilatera*, Chd. Last December, while looking over the material taken at the above place, I turned this specimen over and noticed that the last ventral segment was reddish testaceous. This is different from the typical *rectilatera*, and I soon ascertained that the insect was *Cicindela flavopunctata*, Chevr., recorded heretofore in the United States only from Nogales, Arizona, on the Mexican border. My specimen is a female, and when compared with females of the sub-species *rectilatera* (placed as a sub-species of *flavopunctata* by Dr. Walther Horn in his "Index," published February, 1905), from Texas, it is lighter brown in colour, the elytral suture is more coppery, the head, thorax and body are not so robust, and the last abdominal segment is bright reddish testaceous. As establishing the north-eastern range of this species, it may be noted that Alamogordo is eighty-seven miles north-east of El Paso, Texas, on the Rio Grande, the boundary line between the United States and New Mexico.

The F. H. Snow expedition from the University of Kansas to south-east Arizona, in August, 1905, was fortunate in securing a large series of the heretofore rare *Cicindela pimeriana*, Lec., east of Douglas, on the Mexican boundary. This species, while almost identical in colour with *unicolor*, Dej., and in form with *Hornii*, Schp., is easily recognized despite the rather meagre description we have of it. It is longer than *unicolor*, thorax slightly longer, anterior angles more prominent, constricted at base and apex slightly more than *unicolor*, with median depression deeper. Elytra gradually widening from base to near apex, being almost identical in shape with the body of *Hornii*, except that it is a little smaller and flatter. Labrum white in both sexes, antennæ more slender than in *unicolor*, with basal joints less hairy. Front of head equally hairy in both sexes. Elytra smoother and more shining than in *unicolor*. Colour varying from purple to green. Humeral dot and transverse dash of median band of elytra occasionally present. Upon request, Mr. Eugene G. Smyth, of Topeka, Kansas, examined the elytra of *pimerina*, and reports as follows: "Under strong power of the microscope, the elytral tips show decidedly serrulate—minutely and beautifully serrulate. The elytral tips of *pulchra* and *scutellaris*, examined under the same power, are entirely smooth. Comparing the surface of elytra of the three species: *scutellaris*, surface smooth, scarlet to crimson, iridescent in all lights, impunctate, or with shallow green punctures anteriorly; *pulchra*, very smooth,

crimson to violet, iridescent only in certain lights, impunctate at apex, strongly punctate anteriorly, the punctures brilliant crimson ; *pimeriana* smooth, uniform green, iridescent in certain lights, strongly punctate throughout, as in *fulgida*, the punctures being vivid violet towards apex, more brassy towards humerus. The apparent bluish colour of *pimeriana* is probably due to the combination of green and violet, as there is not the slightest trace of blue to be seen under the microscope."

The late M. L. Linell, in Proceedings of the National Museum, No. 1096, pages 726–7, describes *Lachnosterna alpina* from four male specimens, taken near Alta, Utah. Last December Mr. Tom. Spalding gave me two specimens of this insect, which he obtained by digging, at an altitude of about 10,000 feet, on November 26th, near Alta. They were male and female, and as the original description was made from males, some notes and comparisons with the male may be of interest.

Male: length, 17 mm.; width, 9 mm. Female: more robust ; length, 18 mm.; width, 10 mm. Antennal club a little more than half the length of the stem. Punctuation of thorax not so dense as that of the male, but punctures deeper. Punctuation of head dense and deep. Hairs on metasternum not so long or numerous as in male. Pygidium sparsely punctured, with punctures deeper than in male. Hind tarsi shorter and more slender than those of the male. Penultimate segment of abdomen strongly margined. The genital structure is very close to that of *dubia ;* the pubic process is almost identical with that of *dubia*, except that it is smaller, slightly flatter and the truncated tips slightly arcuate, with the bristles at the tip and on front surface more numerous and not so long as in *dubia*. The superior plates the same as in *dubia*.

Proceedings of the Hawaiian Entomological Society for the year 1905. Honolulu, April 3, 1906. 36 pages, two plates.

The group of able and enthusiastic Entomologists now resident in Honolulu have organized a Society and published their first year's proceedings in pamphlet form. While the papers and discussions naturally deal with local species, there is much in them of general interest ; the most important article is Mr. Van Dine's "Notes on a Comparative Anatomical Study of the Mouth-parts of Adult Saw-flies," illustrated with two plates. We heartily wish abundant success and continued prosperity to this new Society and its members.

A FIRST LIST OF ONTARIO ODONATA.

BY E. M. WALKER, B. A., M. B., TORONTO.

(Continued from page 110.)

Sub-family *Cordulegasterinæ*.

40. *Cordulegaster maculatus*, Selys.—Port Sidney, 1897 (W. Brodie). Also reported from Ontario by Hagen.

41. *Cordulegaster diastatops*, Selys.—Port Sidney, June 17, 1896 (W. Brodie).

42. *Cordulegaster obliquus*, Say.—In an old box of entomological fragments I found part of the abdomen and one wing of a dragon-fly very different from anything else in my collection. On receiving a specimen of *obliquus* from Dr. Calvert recently, I at once recognized my fragments, and a careful comparison showed that they indeed belong to this species, which could scarcely be mistaken for any other. The specimen was taken many years ago at De Grassi Pt., but I recollect nothing about its capture, and have never seen a *Cordulegaster* of any kind since.

Sub-family *Æschninæ*.

43. *Boyeria vinosa*, Say.—De Grassi Point, July 17-Aug., 1901; Algonquin Park, Aug. 8–31, 1902–'03, abundant along the North Branch of the Muskoka River.

The nymphs are found at De Grassi Pt., in the clear water, under stones near the lake shore. They transform on boulders, boat-houses, wharves, etc., sometimes climbing to a height of six or seven feet, but usually only three or four.

After the first flight the imagoes often rest for a day or so under the verandah roofs of the cottages, which are only a few steps from the shore. After this I have only occasionally seen them flying quite low along the margin of the lake, but never away from the water. In Algonquin Park they are abundant, but never seem to leave the vicinity of the rivers.

44. *Epiæschna heros*, Fab.—There are two specimens of this insect bearing Toronto labels in Dr. Brodie's collection in the Educational Dept., Toronto. I have twice seen an immense dragon-fly at De Grassi Point, in July, 1903, which I think could have been none other than this species.

45. *Æschna constricta*, Say.—Hamilton (Anderson); Toronto, July–Sept.; De Grassi Point, July 17, 1904–Sept.; Algonquin Park, Aug. 28, 1902; Thessalon, Algoma. The commonest *Æschna* at Toronto, but at De Grassi Point it is usually far outnumbered by *A. verticalis*. This was not the case, however, in 1904.

46. *Æschna clepsydra*, Say.—De Grassi Point, Sept. 9, 1901; Dwight, Aug. 23, 1903; Algonquin Park, Aug. The commonest species in Algonquin Park in 1902–'03, but scarcer southward.

47. *Æschna vertícalis*, Hagen.—Point Pelee, Aug. 7, 1901; Toronto; De Grassi Point, July 16–Aug. 28, 1901, abundant; Tobermory, Bruce Co., Aug. 25, 1901; Algonquin Park, Aug.; Thessalon, Algoma.

48. *Anax junius*, Drury.—Toronto, April–June, Sept., abundant; De Grassi Point, July 9, 1901, Aug. 8, 1901, teneral; Stokes Bay, Lake Huron, Aug. 27, 1901; Queenston, July 1, 1903. The earliest species to appear in the spring.

Family Libellulidæ.

Sub-family *Macromiinæ*.

49. *Macromia Illinoiensis*, Walsh.—De Grassi Pt., July 17–Aug.; Algonquin Park, Aug.

This species breeds in Lake Simcoe, and the exuviæ are often found upon tree-trunks and boathouses, usually ten or fifteen feet from the shore, and sometimes six or seven feet above the ground. The imagoes are often seen patrolling the roads through the woods, where they fly with great swiftness in a more or less regular beat, and seldom rest. They may also sometimes be seen flying low over the water.

50. *Didymops transversa*, Rambur.—De Grassi Point, July 4, 1901, 1 ♀ from poplar thicket. I have seen two or three others, but they are very rare. A number of exuviæ were found in Algonquin Park, where they are probably fairly common.

Sub-family *Cordulinæ*.

51. *Neurocordulia Yamaskanensis*, Prov.—A number of exuviæ of a *Neurocordulia* were found on the logs of a timber-slide on Ragged Lake, Algonquin Park, in Aug., 1903. Drs. Calvert and Needham, to whom specimens were sent, both expressed the opinion that the species should be *Yamaskanensis*, as the nymph of *obsoleta*, the only other regional species, is already known and is distinct. *N. Yamaskanensis* was described by Provancher from specimens taken on the Yamaska River, P. Q.

There is a ♂ *Neurocordulia* in Dr. Brodie's collection which is not *obsoleta*, but I had no opportunity of ascertaining whether it be *Yamaskanensis* or not.

52. *Epicordulia princeps*, Hagen.—Hamilton (Anderson); Toronto, June; Algonquin Park, Aug., 1 exuvia (Hahn).

This insect breeds in Grenadier Pond, Toronto, but is not very common. I found about a dozen exuviæ in a boathouse, and one attached to a reed at the water's edge, and have occasionally seen the imagoes flying over the water. They seem to be quite tireless in flight. The species is probably locally common in Ontario, as I have frequently seen it in collections. There are many specimens in Dr. Brodie's collection, but they are unlabelled.

53. *Tetragoneuria spinigera*, Selys.—I have 1 ♂, 2 ♀♀, of this insect taken by Mr. J. B. Williams at High Park, Toronto, May 24, 1902. They are all tenerals. Mr. Hahn has some exuviæ from Algonquin Park, which I believe belong to this species.

54. *Tetragoneuria cynosura*, Say.—Toronto, June–July 14, 1904. Algonquin Park, Aug., exuviæ (?).

55. *Tetragoneuria semiaquea*, Burm.—Toronto, June, July; De Grassi Pt., July; Go Home and Burwash Bay, Sept. 17, 1903, mature nymphs; Algonquin Park, July 25, 1900 (Macoun), Aug., 1903 (exuviæ).

I have bred both *cynosura* and *semiaquea* from nymphs taken from Grenadier Pond, Toronto, and do not believe they can be separated by the characters given by Needham. I am pretty well satisfied that they are one and the same species.

Semiaquea is much the commoner form wherever I have collected.

56. *Helocordulia Uhleri*, Selys.—Algonquin Park, Aug., 1903–4, a number of exuviæ.

57. *Somatochlora elongata*, Scudd. — Toronto, June; De Grassi Pt., June 29, 1901–July 19, 1904; Algonquin Park, Aug. 17–20, 1903.

This species is abundant at Lake Simcoe and Algonquin Park, but is very difficult to capture, as it usually flies at a height of twenty to forty feet, seldom descending to within reach of the net. It frequents woodland roads and glades. I took one specimen inside the house at Toronto.

The superior appendages of the male are more incurved in the examples from Toronto and Lake Simcoe than in those from Algonquin Park.

58. *Somatochlora forcipata*, Scudd.—Algonquin Park, July 15, 1900, 1 ♂ (Macoun).

59. *Somatochlora tenebrosa*, Say.—Hamilton (?), 1 ♂ (Anderson).

60. *Cordulia Shurtleffi*, Scudd.—Algonquin Park, Aug. 11, 1904, 1 exuvia (Hahn).

61. *Dorocordulia libera*, Selys.—De Grassi Pt., July, rare; Thessalon, Algoma, 1 ♂.

Sub-family *Libellulinæ*.

62. *Nannothemis bella*, Uhler.—This species has been reported from Ontario by Hagen, but I have never seen it at large.

63. *Celithemis eponina*, Drury.—Toronto, July, common around Grenadier Pond; Sarnia, Aug. 12–16, 1901.

64. *Celithemis Elisa*, Hagen. — Toronto, June 24–July, 1901, common locally; Go Home, Georgian Bay; Sarnia, Aug. 12, 1901, common; Dwight, Muskoka, Aug. 23, 1903, 1 ♂.

65. *Leucorhinia intacta*, Hagen.—Hamilton, June; Toronto, May 20, 1903–July, Aug. 26, 1904, very abundant; Lake Simcoe, June–July 13, 1901.

This species breeds in great numbers in Grenadier Pond, and after *Anax junius*, is the first one to appear in the spring. The specimen taken on Aug. 26 had emerged long after the regular season for the species was over. It was a rather undersized teneral female, and the wings are suffused with a smoky colour, and deep yellowish at base.

66. *Leucorhinia glacialis*, Hagen.—This insect has been reported by Hagen from London and Michipicoten, Lake Superior.

67. *Leucorhinia frigida*, Hagen.—There are a number of specimens of both sexes of this species in the collection of the Biological Dept., Toronto, taken at Go Home, Georgian Bay. I have also two females from Algonquin Park, taken by Prof. Macoun July 7, 1900.

68. *Sympetrum scoticum*, Don.—De Grassi Pt., July 3, 1904, 1 ♂ from a clearing in a tamarack swamp near a sluggish stream. I have done much collecting in this spot, but have never seen another example. It has been reported from Ontario once before by Hagen, and probably occurs more commonly in the north, as I have found it abundant in Quebec.

69. *Sympetrum costiferum*, Hagen.—Toronto, July–Aug.; Toronto Island, flying over the lagoons, July 25, 1904; Bruce Peninsula, Aug. 23, 1901; Thessalon, Algoma. This species is somewhat local, but is fairly common along the Don River, Toronto, and around the lagoons at Toronto Island.

70. *Sympetrum vicinum*, Hagen.—Toronto, Sept. 8, 1902; Point Pelee, Aug. 7, 1901; Walpole Island, River St. Clair, Aug. 13, 1901; Algonquin Park, Aug. 18–Sept. 1, 1902–3; Dwight, Sept. 2, 1902; De Grassi Pt., Aug.–Sept. A very common and generally-distributed species.

71. *Sympetrum semicinctum*, Say.—Toronto, Oct., 1891; De Grassi Pt., Aug., very rare; Go Home, Georgian Bay; Algonquin Park, Aug. 17, 1903; Catfish Lake, Algonquin Park, July 23–25, 1900 (Macoun). A local species, sometimes common where it occurs.

72. *Sympetrum assimilatum*, Uhler. — Walpole Island, River St. Clair, Aug. 13, 1901, a fair specimen taken with *S. rubicundulum* and *obtrusum* from an open marsh.

73. *Sympetrum rubicundulum*, Say. — Hamilton; Toronto, July–Nov.; De Grassi Point, July 15, 1901–Sept.; Walpole Island, River St. Clair, Aug. 13, 1901; Niagara Glen, June 28, 1903; Go Home, Georgian Bay; Algonquin Park, July–Aug.; Thessalon, Algoma. Our most abundant *Sympetrum*. Specimens from Walpole Id. average considerably larger than those from Algonquin Park.

74. *Sympetrum obtrusum*, Hagen.—Toronto, July–Oct.; De Grassi Pt., July–Sept.; Walpole Id., River St. Clair, Aug. 13, 1901; Southampton, Aug. 20, 1901; Algonquin Park, July–Aug. Abundant, but less so, as a rule, than *rubicundulum*.

75. *Sympetrum corruptum*, Hagen.—Toronto, Humber River, Sept. 25, 1891, 1 ♀ (Brodie).

76. *Pachydiplax longipennis*, Burm. — Hamilton (Anderson); Toronto, June 22, 1903–Aug.; Burwash Bay, Georgian Bay, Sept. 17, 1903, mature nymphs.

I have bred this species from nymphs taken in Grenadier Pond, Toronto, where it flies in abundance in July.

77. *Mesothemis simplicicollis*, Say —Point Pelee, Aug. 8, 1901, 1 ♂ worn and pruinose; Hamilton (Anderson); Toronto, June 20, 1903; De Grassi Pt., July 13, 1901. A common species in Toronto and southward, but rare further north.

78. *Micrathyria berenice*, Drury.—This species has been reported by Calvert from the Thousand Islands, New York, and is therefore doubtless a resident of the adjoining parts of Ontario.

79. *Ladona Julia*, Uhler.—London; Toronto, June 24, 1904; Go Home, Georgian Bay, July 19, 1904, young and half-grown nymphs, 1 ♂ imago, no date; Algonquin Park, July 5, 1900 (Macoun).

80. *Libellula incesta*, Hagen.—Pt. Pelee, Aug. 7, 1901, 3 ♀ ♀.

81. *Libellula basalis*, Say.—Hamilton; Toronto, June 22, 1901–July, abundant at High Park; Lake Simcoe, July 4, 1901; Niagara Glen, June 28, 1903.

82. *Libellula quadrimaculata*, L.—Hamilton; Toronto, May 20, 1901–July; De Grassi Pt., July 4, 1901.

This widespread species is always common in Ontario, and sometimes exceedingly abundant.

83. *Libellula semifasciata*, Burm.—Toronto, High Park, June 11, 1901. June 15–22, 1903, common and the first *Libellula* to appear in the spring.

84. *Libellula pulchella*, Drury.—Point Pelee, Aug. 7, 1901; Sarnia, Aug. 12, 1901; Hamilton, June; Toronto, June 22–Aug.; De Grassi Pt., July 3–5, 1901; Go Home, Georgian Bay, July, 1904; Thessalon, Algoma.

This species is nearly as abundant and some seasons more so than *L. quadrimaculata*.

85. *Plathemis Lydia*, Drury.—Point Pelee, Aug. 8, 1901; Niagara Glen, June 28, 1903; Hamilton; Toronto, June 24–July; De Grassi Point, July 15–19, 1901; Thessalon, Algoma.

86. *Tramea Carolina*, L.—Toronto, May 24, 1904, one fresh male. The only other *Tramea* I have ever seen was flying over a pond near Toronto, on June 24, 1901. I watched it for half an hour, but it never rested, and never came within my reach.

TWO NEW HOMOPTERA FROM AFRICA, AND SYNONYMICAL NOTES.

BY G. W. KIRKALDY, HONOLULU.

Superfamily Tetigonioidea.

Scaphoideus Annæ, sp. nov.—Different from all the other species of *Scaphoideus* known to me, by the presence of only one median subapical cell in the tegmina, instead of two; the subcostal (marginal) cell widens apically, the outer branch of the radial vein being continuous up to the apex of the tegmen, not ending at the base of the subapical cells as in the other species. The interolateral margins of the eyes are straight, diverging very slightly towards the dorsal apex, and the posterior margin of the pronotum is a little more emarginate. It may be taken as the type of a new subgenus, *Scaphoidophyes*. (*Scaphoideus* proper has been found in America, Ceylon, Japan, Australia and Hawaii, the last doubtless introduced.)

Vertex black, with three small whitish testaceous spots at the apex, this being also the colour of the face, sterna and legs. There are also two tiny testaceous specks, and a short, narrow line at base of vertex. Pronotum dark fulvous, anterior and lateral margins irregularly black. Scutellum pinkish brown, posteriorly ivory-white, lateral margins broadly black. Tegmina fulvotestaceous, subhyaline, subcostal (marginal) area ivory-white, a black wedge about the middle ; extreme base, veins more or less, and apex of tegmina, blackish smoky. Wings smoky. Vertex not quite as long, or about as long, as broad between the eyes, apically obtuse angled. Pronotum basally a little wider than head with eyes. Anal vein of tegmina united to suture by a cross vein which is curved apically. Length, 6 mm. to apex of tegmina.

Hab.—Africa, Hinterland of the Ivory Coast, Bouake.

Superfamily Fulgoroidea.

Oliarus Bouakeanus, sp. nov.—Allied to *O. Natalensis* (Stal.).

Ferruginous, deepening on the scutellum ; a spot on each side of the vertex, the pronotum in the middle, keels of frons and clypeus, and a spot at the junction of the two last named, yellowish. Scutellar keels yellowish-ferruginous. Tegulæ obscure yellowish, sometimes darker at the extreme anterior part. Tegmina hyaline, more or less unevenly suffused with cinereous, strongly granulate, subcostal (marginal) vein with about 18 or 19 granules, of which 13 are on the apical half and 4 close to the base. Apical half of tegmina with irregular brown spots and flecks. Veins pale yellow or colourless, granules blackish brown. Stigma obscure pale brown, with a dark streak on the interior margin. Legs pale yellowish. Abdomen more or less dark ferruginous.

Vertex a little longer than wide, a little wider at base than an eye, lateral margins converging anteriorwards, and forking about their middle, the inner branches meeting acute-angularly. Head much narrower than the pronotum. Lateral keels of scutellum straight, converging a little posteriorly, submedian keels curved. Radial vein forks much farther from the base than does the cubital. Length 5½–6½ mm. to apex of tegmina.

Hab.—Africa, Hinterland of the Ivory Coast, Bouake.

Synonymical Notes, Etc.

Cathedra, Kirkaldy, 1903, Entom., XXXVI, 179 = *Pristiopsis*, Schmidt, 1905, Stettin. Ent. Zeit., LXVI, 332 (homotypical).

Delphacissa, new subg. of *Delphacodes*, representing Fieber's typical subgenus of "*Delphax*," characterized by "Stirnkiel bis auf den Scheitel fadenförmig"; type *uncinata*.

Delphacodes Melichari, n. n. =|| *Liburnia fumipennis*, Melichar, nec Fieber.

D. Annæ, n. n. =|| *Delphax concinna*, Fieber, nec Stal.

D. taprobanensis, n. n. =|| *Liburnia pallidula*, Melichar, nec Boheman.

D. sinhalanus, n. n. = *Liburnia frontalis*, Melichar, nec Kirschbaum.

D. Kahavalu, n. n. = *Delphax venosus*, Motshulsky, nec Germar.

Eumelicharia, n. n. =|| *Walkeria*, Mel., nec Flem., type *Flata radiata*, Dist.

Ormenis epilepsis, n. n. =|| *marginata* (Brünn).

I wrote Dr. Melichar some years ago that his names were preoccupied, but as he has not, to my knowledge, altered them yet, I must do so now.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 13.

Some Beetles of Early May.

BY C. J. S. BETHUNE, LONDON, ONTARIO.

Many of our younger members are now for the first time forming a collection of insects. They are filled with delightful enthusiasm, and almost everything is a prize that comes within reach of their nets. Butterflies and beetles are usually the first to attract attention and to become the most conspicuous features in the incipient collection. Not many of the former are yet on the wing, but an almost endless variety of beetles may be found by careful search, aided by sharp eyes and nimble fingers. It is the object of this paper to draw attention to some of the more conspicuous species.

First in order come the Tiger Beetles (*Cicindela*), of which over thirty varieties are to be found in the Dominion, but only about a dozen in Ontario. These lively creatures are to be found in hot sunny places, such as the sandy margins of streams, dry roads and footpaths, and one or two species on logs or boulders to which the sunlight has access in open woods or groves. Though brilliantly metallic in colouring when closely observed, they generally conform very much to the ground they frequent, and would not be seen by an untrained eye, but a little watchfulness soon reveals the beetle as it runs about in search of its prey, and

then a swift stroke of the net is required for capture. They are ever on the alert, and when alarmed take instant flight for a few yards, and come to the ground with their face to the pursuer; as he draws near they fly again, and after some distance has been covered in this way, a long flight is made back to the starting place. However, after a little practice they can be captured in fair numbers. The following are our commonest species:

Cicindela vulgaris (fig. 13) and *C. purpurea* (fig. 14) are widely distributed, and may be found very early in the season; the figures show their characteristic markings, the latter, as its name implies, is of a beautiful reddish purple colour above. *C. generosa* (fig. 15) is a magnificent

Fig. 13.

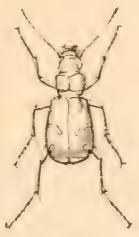

Fig. 14.

Fig. 15.

Fig. 16.

Fig. 17.

creature, but is not nearly so abundant as the preceding species; sometimes it is found in gardens. *C. hirticollis* (fig. 16) and *C. repanda* frequent hot sandy places, but *C. sexgutta* (fig. 17), a very beautiful metallic-green species, and *C. punctulata*, a slender and smaller blackish beetle, are found in open woods or on somewhat shady roadsides. The larvæ of these beetles (fig. 18), live in holes in the sand, where they lie in wait for their prey; they have a metallic head with formidable jaws, and a curious hump on their backs, which prevents them from slipping down in their dens.

Fig. 18.

On dull cloudy days, when there are no Tiger Beetles about, and on bright days also for that matter, the collector may turn over loose stones, logs, pieces of board, or other rubbish, and he will be sure to find a variety of beetles of all sizes hurrying away to hide themselves from the sudden exposure to light. These are for the most part

Ground-beetles (*Carabidæ*), which form a very large family, the members of which resemble each other closely in general appearance, and, with few exceptions, are very hard to name correctly. Fig. 19 (*Harpalus caliginosus*) represents a common shape and the prevailing black colour; (fig. 20) the Bombardier beetle (*Brachinus*), so called from its remarkable power of discharging a very pungent fluid, accompanied by a slight report and some smoke-like vapour; this will stain the captor's fingers, and is evidently a means of defence against ordinary enemies; the head and thorax of this beetle are yellowish-red, and its wing-covers dark blue.

Fig. 19.

Fig. 20.

A large and handsome beetle of this family will also be occasionally met with—the Caterpillar-hunter—(*Calosoma calidum*), fig. 21. It is black, with rows of bright coppery spots on the wing-covers, and may be at once recognized from the figure. When handled it leaves on the fingers a persistent odour that is not very agreeable. With these ground beetles the collector is sure to find some very pretty silky-green specimens of medium size (*Chlænius sericeus*).

Fig. 21.

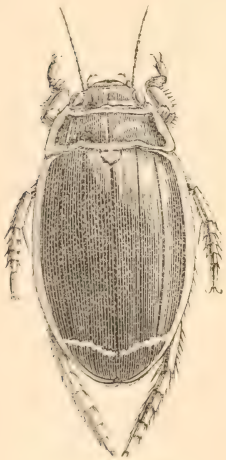

Fig. 22.

Let the explorer now turn to the water. In shallow ponds in fields and meadows, which dry up in summer, there will usually be found a variety of swiftly-swimming water-beetles; one of the largest, *Dytiscus Harrisii*, is shown in fig. 22. These are by no means easy to catch, but with a long-handled water-net one may have exciting sport and fair success. In the mud, or running over it, on the margins of pools and streams, many minute species of beetles will also be found.

The enthusiastic collector is not apt to be fastidious, and will not, therefore, hesitate to turn over horse and cow manure, under the masses of

which he will find Rove-beetles (*Staphylinidæ*), long, narrow creatures, whose wing-covers only partially cover the abdomen, and who run swiftly with their tails turned up over their backs; also several species of Dung-beetles (*Scarabæidæ*), one of which has a black head and thorax and bright wing-covers, the colour of red sealing-wax (*Aphodius fimetarius*).

Flying low in open fields on the borders of woods, and making a noise like a bumblebee, there may be captured a stout hairy beetle, half an inch long, of an ivory colour, sprinkled all over with irregular black spots (some specimens are entirely black)—this is sometimes called the Bumblebee beetle (*Euphoria inda*). When it appears again in the autumn it is known to fruit-growers as a very destructive creature, from its habit of burrowing into ripe pears and peaches.

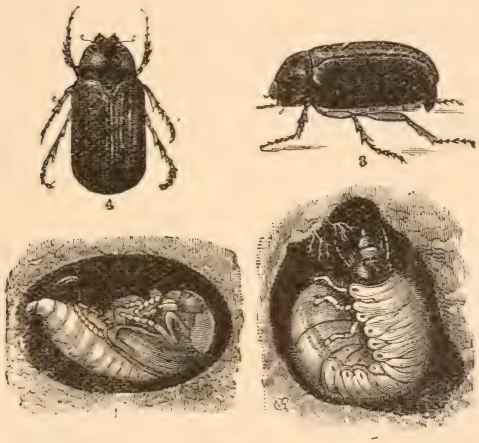

FIG. 23.

During warm evenings the May beetles or Cockchafers (*Lachnosterna*) come out in myriads, attacking the tender foliage of trees and shrubs, and often coming into houses, attracted by light. Fig. 23 represents the beetle and its grub and chrysalis. Later on in the month, about Victoria day, May 24, the handsome Goldsmith beetles (*Cotalpa lanigera*) are on the wing for a few evenings, and may be found under electric lights in the streets of towns and villages. This fine beetle has the head and thorax golden and the wing-covers creamy-yellow; beneath it is metallic-green with a woolly breast.

FIG. 24

Enough has now been written to show the young collector what a rich field is open to him in air and field and water, and what an infinite variety of curious and beautiful forms will reward a patient search. The joy of success may soon be his, and he will be filled with the delight of finding new and interesting creatures wherever his explorations may extend.

NEW ROCKY MOUNTAIN BEES, AND OTHER NOTES.

BY T. D. A. COCKERELL, BOULDER, COLO.

Bombus iridis phaceliæ, n. var.—♀. Hair of face black, with a little pale intermixed; yellow hair of thorax in front dense, not at all mixed with black; yellow of scutellum neither divided nor mixed with black; hair on inner side of basal joints of tarsi dark; *hair on second and third abdominal segments entirely deep red* (much less dense, and not nearly so bright as in *B. ternarius*), but second with a large bare median triangle; hair of fourth segment and sides of fifth yellow.

Hab.—Ward, Colorado; alt. 9,000 ft., at flowers of *Phacelia circinata*, July 18, 1905. (W. P. & T. D. A. Ckll.) This has the structure of *B. iridis*, but the brightly-coloured abdomen gives it such a different aspect that I at first took it for a new species. I am now convinced that *B. iridis* belongs to the series of *B. ternarius*, in which it is easily recognizable by the red of abdomen being confined to segments 2 and 3, hair of face mostly black, yellow of thorax anteriorly not mixed with black, and pubescence on inner side of hind tarsi fuscous. No doubt *bifarius* and *ornatus* are varieties of *ternarius*, but *iridis* appears to be a perfectly valid species.

Osmia hypocrita, n. sp.—♀. Black; of the narrow, parallel-sided type; abdomen shining, scopa black; front, vertex, thorax above, and first two segments of abdomen, with much rather dull white hair; pleura, rest of abdomen, and legs, with black hair, not at all dense. Length about (or hardly) 13 mm., width of abdomen about 3½ mm. In all respects this is so like *Monumetha argentifrons* that, until I examined it with a lens, I did not doubt that it belonged to that species. It is, nevertheless, undoubtedly distinct, and will be easily separated by the following characters: Mandibles smaller, in the closed condition I see only two teeth, and there do not seem to be others; the upper and lower (or inner and outer) mandibular carinæ are, at their ends, at least twice as close together as those of *M. argentifrons*; clypeus with a strong, smooth and shining, longitudinal median ridge; anterior edge of clypeus somewhat turned up, and broadly and shallowly emarginate; hair on clypeus and at its sides white, but some short black hair near its anterior edge; eyes *diverging* above (in *M. argentifrons* they slightly converge above); hair on lower part of cheeks white; vertex smaller; parapsidal grooves strongly converging anteriorly; punctures of mesothorax denser and smaller; the wings offer nothing distinctive in colour or venation, except that the second recurrent nervure is less distant from the end of the second submarginal

cell ; the abdomen and legs are about the same, except that the light hair of the abdomen has not any distinct tendency to form patches, and is reduced almost to nothing on the third segment. Perhaps this should be referred to *Monumetha*, if that is a valid genus ; but I am not quite sure whether it is really a close ally of *M. argentifrons* or an example of "convergent evolution." *O. frigida*, Sm., seems to be allied.

Hab.—Boulder, Colo., June 27, 1905. (W. P. Cockerell.)

Osmia Novomexicana, Ckll., was taken at Boulder, Colo., June 17, 1905. (W. P. Cockerell.) It is new to Colorado.

Nomada ornithica, n. sp.—♂. Length, 8 mm., or a little more ; black and lemon-yellow, with some red on legs ; belongs to the subgenus *Xanthidium*. Head and thorax densely and coarsely rugoso-punctate ; eyes sage-green ; head broad ; mandibles (except apically), labrum, clypeus, supraclypeal mark (which is large, and broader than long) and lateral face-marks all yellow, except that there is a very small black spot on each side of clypeus, at the suture ; labrum with a very small apical tubercle ; face little hairy, but the supraclypeal area and upper part of clypeus are covered with appressed white hair ; lateral face-marks triangular, following clypeus to the top, but ending bluntly and a little away from the orbital margin, a short distance below level of antennæ ; lower orbital margin narrowly yellow, the stripe going a short distance up the posterior margin ; scape swollen, lemon-yellow, black behind ; flagellum thick, red beneath and laterally, but black above, the black more extensive on the apical joints ; no sign of denticulation ; third antennal joint about half as long as fourth ; mesothorax coarsely rugoso-punctate, entirely black ; upper border of prothorax, tubercles, tegulæ, large mark on pleura (having the shape of a bird's head and neck, the tip of the bill almost touching the tubercle), scutellum, except margins, and a short band on postscutellum, all yellow ; scutellum swollen and bigibbous ; metathorax black, with a small yellow spot on each side near the lower end ; anterior coxæ without spines ; legs yellow, suffused with ferruginous basally, with black on the coxæ, trochanters, and posterior femora and tibiæ behind ; wings dusky at apex, stigma ferruginous, nervures more fuscous ; basal nervure meeting transverse-medial ; second submarginal cell twice as broad as third above ; abdomen very minutely punctured, and with six broad yellow bands, the intervals between the first four black, but the hind margins of the fourth and fifth segments reddish ; apical segment black basally ; apical plate notched ; ventral segments nearly all

yellow, with the hind margins broadly light reddish, except the basal segment, which is black, with a large yellow mark not unlike a buffalo-skull in shape.

Hab.—Boulder, Colo., June 11, 1905. (W. P. Cockerell.) In many respects this agrees with the description of *N. flavipes*, Provancher, but I have supposed that to be really a *Micronomada*. Should *flavipes* prove to be a *Xanthidium*, it will be separated from *N. ornithica* by its larger size, yellow posterior orbits, yellow of scutellum reduced to two spots, darker wings, etc., but it is known only in the female, and the male might show more resemblance. In my table of Rocky Mountain *Nomada*, *N. ornithica* runs to *N. civilis*, which it closely resembles in general appearance, but it is easily known from *civilis*, by the broad short lateral face-marks, the much more parallel orbits, the longer fourth antennal joint, etc. In my *Xanthidium* table (Proc. Phila. Acad., 1903, p. 580) it runs to *N. vascoensis*, but differs in the lateral face-marks, much less red on legs, etc.

Augochlora fervida, Smith.—Boulder, Colo.; 2 ♀'s, June 4 and 10, 1905. (W. P. Cockerell.) Mr. Titus does not credit this species to Colorado in his article in CAN. ENT., May, 1901. Our specimens have the hind spur with four spines, except that one has only three on one side. They differ from *A. humeralis* in having the first four ventral segments of abdomen green, but it is doubtful whether *humeralis* is really a distinct species. In Mr. Vachal's recent paper (Misc. Entomologica, 1903–4) the species of *Augochlora* are referred to *Halictus*, and *humeralis*, being preoccupied in that genus, is changed to *Pattoni*. However, the description of *Pattoni* given by Vachal does not accord with *humeralis*; but, except for certain characters (colour of tibiæ and tarsi, 4 spined spur) of the legs, suggests *A. cærulea*, Ashm., and a specimen is cited from Fort Lupton, Colo., which must be one of those already recorded by Titus as *cærulea*. On the other hand, I feel reasonably sure that the Texas material of *chorisis*, Vachal, must have been *fervida*.

Sphecodes eustictus, n. sp.—♀. Length hardly 6 mm. A *Sphecodium* (this hardly seems a distinct genus), allied to and closely resembling *S. Cressonii*, Rob., or *S. mandibularis*, Cress. (these are probably not distinct species), but very easily distinguished from these by the conspicuously punctured second abdominal segment.

Labrum not emarginate; mandibles ferruginous; antennal joints 3 and 4 both very short, and of about the same length; punctures of vertex strong and dense; of clypeus very large but sparse; mesothorax shining, with large, distinctly-separated punctures; tegulæ pale testaceous; area

of metathorax semicircular, well defined, well plicate basally, otherwise with irregular raised lines, forming a few polygonal areas : basal nervure falling short of transverso-medial ; fifth and sixth abdominal segments darkened ; first segment with very sparse punctures, irregularly scattered, some large, some microscopical, the effect reminding one of the stars in the sky ; basal half of second segment with numerous very distinct punctures, and minute (microscopical) ones scattered between ; third segment hairy, with numerous minute piliferous punctures.

Hab.—Prospect Lake, Colorado Springs, Colo., May 22, 1904. (T. D. A. & W. P. Ckll.)

Colletes salicicola, Ckll., subsp. *geranii*, nov.—♂. Compared with female *salicicola* (the only sex known) from Las Cruces, N. M., *geranii* shows the greatest similarity, only the following differences being such as might not well be merely sexual : malar space longer, being about or nearly as long as broad ; first recurrent nervure joining the very broad second submarginal cell at or a little beyond its middle (conspicuously beyond in *salicicola*) ; clypeus with very close small punctures in the middle above ; sides of apical triangle of metathorax (below the transverse ridge) wholly without the definite fine raised lines of *salicicola* ; first abdominal segment more strongly punctured. The abundant white hair is as in *salicicola*. Flagellum long, very dark reddish, nearly black ; stigma ferruginous ; no black hair anywhere ; legs black, only the claws and ends of claw-joints ferruginous ; labrum with a median pit. Length 8 mm.

In my table in *Psyche*, 1905, it runs to *C. gaudialis*, but differs by the colour of the stigma and thoracic hair. It does not agree with anything in Robertson's table ; it runs first to 4, and then on to 5, though joint 4 is not quite as long as 2 + 3, then on to 10, where it could only be compared with *C. productus*, but the punctures of the scutellum are similar to those of the mesothorax, and the tegulæ are clear testaceous (black in *productus*).

Hab.—Boulder, Colo. (W. P. Cockerell.) Five males, June 10 to 27 ; one at flowers of wild *Geranium*.

Colletes Tucsonensis, n. sp.—♂. Tucson, Ariz., Nov. 7. (Cockerell.) Length nearly 9 mm.; exceedingly like *C. salicicola geranii*, but differing thus : malar space shorter, distinctly broader than long ; labrum with three broad grooves or sulci ; punctures of mesothorax rather larger ; abdomen broader, the punctures of the first segment sparser. The white

hair is quite the same. It is also very like *C. gypsicolens*, Ckll., but differs from that by the much broader abdomen, with the second and third segments very much more strongly punctured, and the darker, redder stigma. The lateral faces of truncation of metathorax are shining, with piliferous punctures; the triangle (below the cross-ridge) is very shiny, scarcely at all sculptured, except for a median longitudinal keel failing below. The tegulæ are rufo-testaceous, darkened basally. Second submarginal cell very broad; b. n. falling a rather long distance short of t. m. (almost reaching t. m. in *gypsicolens*). In Morice's European table (Tr. Ent. Soc., Lond., 1904), *C. Tucsonensis* runs to *C. nanus*, but it is larger, and the abdominal bands are by no means as broad as the spaces between them. The malar space is, however, rather short for this group, and if we look for the species among those with a short malar space (for which, however, it is a little too long) it runs to 15, and has long erect hairs on disc of second segment, but only short ones on the following. It could then run to 19 (the intermediate joints of posterior tarsi being longer than broad), but the sixth ventral plate is quite simple, there being at most a faint basal elevation of small size to indicate the rudiment of a carina. (This plate is also simple in *gypsicolens*, but in *geranii* it has a distinct though delicate carina).

Greeleyella Beardsleyi, Ckll.—Boulder, Colo., June 5, 1905. (W. P. Cockerell.) One ♂. This genus and species was previously known only from the female, obtained at Greeley, Colo., where, as I learn from Professor Beardsley, it visits the flowers of *Malvastrum coccineum*. The male from Boulder has darker nervures, a less obliquely truncate marginal cell, and the first recurrent nervure enters the first submarginal cell not far from the end, instead of meeting the transverso-cubital. These differences may possibly indicate a second species, but I do not think so. The sexual characters are as follows: Head broad and subquadrate; clypeus creamy white, with a black process directed downwards on each side of the labrum; face otherwise dark; labrum ferruginous, with a prominent transverse ridge or keel; mandibles nearly all ferruginous; tibiæ and tarsi, and about apical third of femora, light ferruginous.

Since writing the above, I have found in my wife's collection a female taken at Boulder, June 17, 1905, at flowers of *Malvastrum*. It agrees in venation with the female type. There is also a male taken June 17, in which the first recurrent nervure joins the transverso-cubital, but otherwise identical with the male of June 5.

Ceratina nanula, Ckll.—Boulder, Colo., June 27, 1905. One ♀ at flowers of *Calochortus Gunnisoni*, and one ♂ at flowers of *Osmodium* (W. P. Cockerell), known from *C. Neomexicana* by the very small size and clear wings. This and the next are new to Colorado.

Ceratina Neomexicana, Ckll.—Common at Boulder, Colo. The male, not before described, differs in the usual manner from the female; the branches of the clypeal T are about equally long, but the upper one is much broadest; the supraclypeal area has a few large punctures; the projecting point on the sixth abdominal segment is covered with light hair having a fulvous tint; apical projection small and low; process on hind femora large, forming more than a right angle. This is, perhaps, more like *C. Tejonensis* than any other male *Ceratina*, but the end of the abdomen is quite different. The Boulder females include specimens with the following data: June 26, at flowers of *Platycodon grandiflorum* in cult. (Ckll.); Aug. 3, in flower of *Argemone intermedia* (Ckll.); June 12, at flowers of *Onosmodium* (W. P. Ckll.); June 27, at flowers of *Calochortus Gunnisoni* (W. P. Ckll.); April (Sellars and Williams).

Sphecodes Pecosensis, Ckll.—Boulder, Colo., 1905. (W. P. Ckll.) The specimen has the mandibles only bulging within, with nothing that could be called a tooth, but it is in all other respects exactly like one from Cheyenne Canon, which has a well-formed tooth, as in the type. It is evident that the presence or absence of a tooth on the mandibles should not be held to distinguish a species of *Sphecodes* (at any rate, when exhibited by a single specimen) in the absence of other characters. *S. Pecosensis* has much superficial resemblance to a number of species, but is easily known by the first two abdominal segments being sparsely punctured, the punctures conspicuously of two sizes, the strongly-depressed suture between these segments, and the dark hair at the apex of the abdomen.

Proteraner leptanthi, Ckll., was also taken by my wife at Boulder (male, June 10); so also *Sphecodes Sophiæ*, Ckll. (♀, June 12.)

Prosopis Fedtschenkoi, n. n.—*Prosopis frontalis* (F. Morawitz, in Fedtschenko, Turkestan Mellifera, II., 1876, p. 275). (Not of Fabricius, 1804.)

The Fabrician insect is a *Camptopoeum*, but it was described as a *Prosopis*, and according to the rules in vogue the name may not be repeated in the genus.

Prosopis Pereziana, n. n.—*Prosopis Morawitzi*, Perez. Esp. Nouvelles Mellifères, 1903, p. 68. (Not of Dalla Torre, 1896.)

Andrena metallescens, n. n.—*Andrena metallica*, Radosz. Horæ Soc. Ent. Ross., 1876, p. 83. (Not of Fabricius, 1793.)

Andrena succincta, Imhof, 1832.—This name is a homonym, because of *A. succincta*, Fabr., 1781, Petagna, 1786 (= *Dasypoda*), but the species is quite uncertain, and being now nameless, may be consigned to oblivion.

Apis dorsata Binghami, n. n.—*Apis zonata*, Smith. Jn. Linn. Soc. III, 1859, p. 8. (Not of Gravenhorst, 1807.)

Apis mellifera Lamarckii, n. n.—*Apis fasciata*, Latreille. An. Mus. Hist. Nat., 1804, p. 171. (Not of Linné, 1767.)

Crocisa Frieseana, n. n.—*Crocisa atra*, Friese. Z. f. Hym. u. Dipt., 1905, p. 7. (Sunda Archipelago.) (Not of Jurine, 1807.)

The following are also homonyms, and must be given new names:

Megachile pruinosa, Friese, 1903. Texas. (Not of Perez, 1897.) Friese (in litt.) holds that *pruinosa*, Perez, is *argentata*.

Sphecodes gracilior, Perez, 1903. Algeria. (Not of Morawitz, 1894.)

Nomada superba, Perez, 1903. France. (Not of Cresson.) Prof. Perez writes that his *superba* is a remarkable variety of *N. chrysopyga*, Morawitz; it may stand as *N. chrysopyga Pereziana*.

Colletes brevicornis, Perez, 1903. (Not of Robertson, 1897.)

Halictus testaceus, Nurse, 1902. India. (Not of Robertson, 1897.) Nurse has proposed the name *H. orpheus* for his species.

Halictus nigricornis, (Fabr.) Say, 1837, does not invalidate *H. nigricornis*, Morawitz, 1886 (from Tibet), because the Fabrician insect was originally described under *Andrena*, and is an *Agapostemon*. It is a generally accepted (I believe) and very excellent restriction of the rule regarding homonyms, that secondary references (*i. e.*, subsequent to the original description) do not count, unless the species referred is still considered to belong to the genus to which it was transferred.*

Eulæma, Lep.—Lepeletier, Hist. Nat. Ins., Vol. 2, 1841, spells this name *Eulæma*, giving *Eulema* as the vernacular (French) rendering. Curiously, all authors have used the latter spelling instead of the former. Scudder (Nomenclator Zoologicus) has the correct spelling.

Epeolus interruptus, Rob.—Boulder, Colo. At flowers of *Townsendia grandiflora*, July 5, 1905. 3 ♀'s. (W. P. Cockerell.) Previously known only from Illinois.

*Incidentally, it is to be noted that some of the names of our Noctuid moths are homonyms. Thus *Lycophotia congrua* is based on *Agrotis congrua*, Smith, 1890, not of Walker, 1865. *Triphæna confusa* is based on *Agrotis confusa*, Smith, 1887, not of Alpheraky, 1882,

NOTES ON SOME MOSQUITOES FROM NEWCASTLE, JAMAICA.

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During the summer and autumn of 1905 several small collections of mosquitoes were sent to me by Major Hassard, of the Royal Army Medical Corps, and Colonel Loscombe, from the Military Station at Newcastle, alt 4,000 feet, and more recently a number of living larvæ from the same locality, collected by Miss Maclaverty. The species represented are as follows :

1. *Stegomyia fasciata*, Fab.
2. *Culex fatigans*, Wied.
3. *Culex secutor*, Theo.
4. *Culex Hassardii*, nov. sp.
5. *Howardina Walkeri*, Theo.
6. *Howardina aureostriata*, nov. sp.
7. *Dendromyia*, ? nov. sp.

1. *Stegomyia fasciata*, Fab.—A few specimens of this form and *S. fasciata*, Fab., sub-species *Luciensis*, Theo., were sent in one of Major Hassard's collections. It appears to be quite uncommon.

2. *Culex fatigans*, Wied.—Specimens were received in all the collections, and the larvæ from rain-water barrels.

3. *Culex secutor*, Theo.—Very abundant and troublesome during the day. Larvæ very numerous in tanks and river-side pools.

4. *Culex Hassardii*, nov. sp.—♀. Head grayish, with narrow curved pale golden scales and hairs clustered thickly on the occiput and between the eyes, upright forked scales on the nape, sides of the head black, eyes bordered with bright white scales; antennæ, palpi and clypeus black; proboscis black, penultimate quarter of its length banded with yellow scales; apex yellow. Thorax grayish, clothed with numerous elongated spindle-shaped black and white scales; white scales collected in two conspicuous white spots near the centre, and a broad area near the scutellum, also in patches along the borders of the mesothorax, a number of long black hairs especially abundant about the origin of the wings. Prothoracic lobes white-scaled. (Fig. 25, 4.) Central lobe of the scutellum white scaled. Lateral lobes black. Pleura black, with several patches of white scales. Metanotum deep brown. Halteres with pale yellow stems and knobs. Legs bluish-black, clothed with black scales

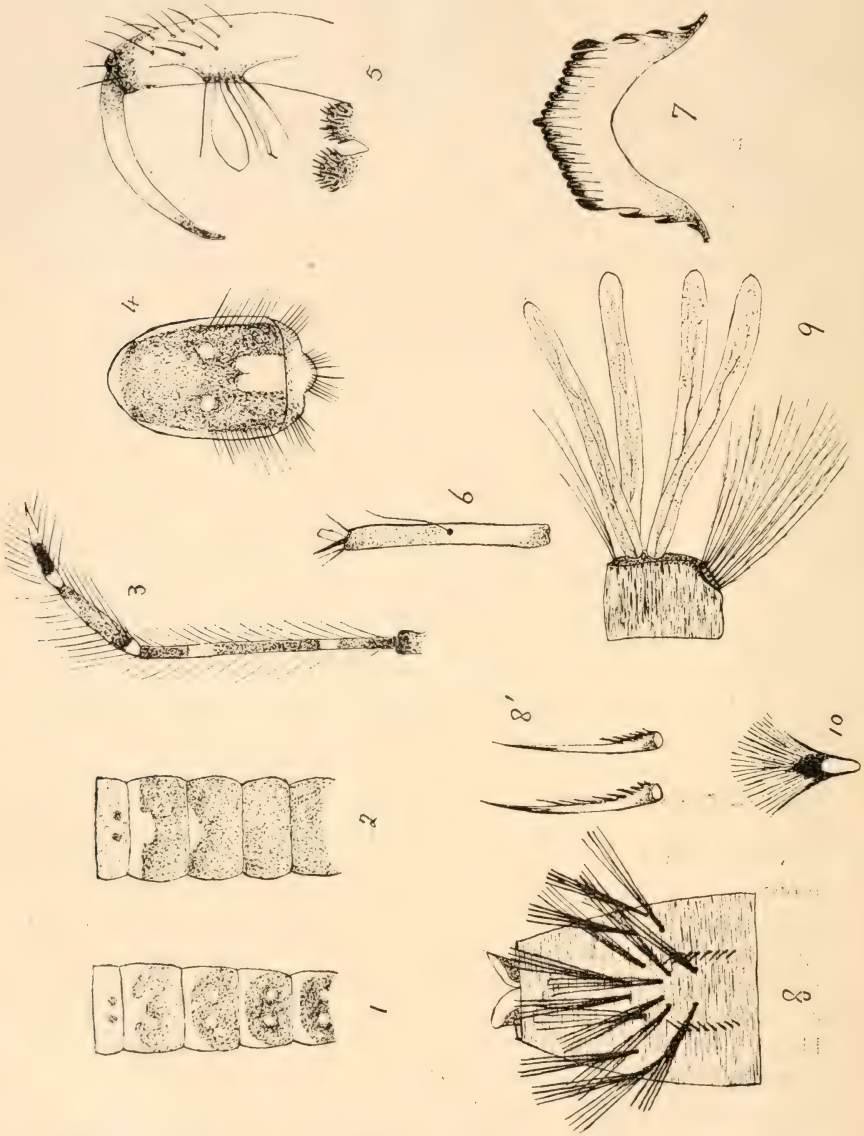


Fig. 25.—Culex Hassardii: 1, male abdomen; 2, female abdomen; 3, male palpus; 4, thorax of female; 5, male genitalia; 6, larval antenna; 7, labial plate; 8, air-tube; 8', teeth; 9, appendages of ninth segment; 10, scale of comb.

with bluish metallic reflections. all joints faintly banded both apically and basally. Venter of femora and tibiæ pale, with white scales. Apical banding of the hind tibiæ conspicuous; ungues equal and simple. Abdomen black, speckled with grayish scales, base grayish, with black and white scales, two black spots in the centre; second segment with broad basal creamy band expanding in the mid line into a square area; third segment with a narrow crescentic basal creamy area, the following segments unbanded; last two apical segments with faint basal bands. All the abdominal segments bordered apically with long white hairs. (Fig. 25, 2.) Wings densely scaled, veins with thick median and broad lateral scales, especially on the third and fourth long veins. Scales not mottled. The first submarginal considerably longer and narrower than the second posterior cell, stem only one-sixth the length of the cell. Stem of the second posterior slightly larger than half the cell; posterior cross vein rather more than its own length distant from the mid cross vein.

Length, 4–5 mm.

♂.—Scale ornamentation of the head and thorax closely resembling that of the ♀. Palpi exceeding the proboscis by the two terminal joints; terminal joints hairy and somewhat swollen, bearing many long hairs in a row on each side; apex and base of the terminal joint white-scaled, penultimate joint basally banded; on the venter, a little below the apex, there is a white scaled area. (Fig. 25, 3.) Antepenultimate joint with two bands of white scales, the distal broader one a short interval below the apex, at a point corresponding to the band on the proboscis: the narrow basal band a short distance above the base; a row of black hairs along the inner aspect; apical region somewhat inflated. Abdomen, base white, with two central black spots; second segment with broad basal band expanding laterally into wide areas, also centrally into two divergent rounded areas. Third and following segments with basal bands expanding at the sides; scales of all the lateral areas brighter than those in the middle portion of the bands, which are creamy; two white spots in the centre of the third and succeeding segments. (Fig. 25, 1.) Appendages of the basal segment of clasp composed of a leaf-like organ and a broad flattened hooked spine, also three simple straight spines. Apical segment terminating in two blunt teeth. (Fig. 25, 5.) Ungues of the fore and mid legs uniserrated and unequal, of the hind equal and simple.

Length, 4–5 mm.

The following points were noted in the adult LARVA : Antennæ short, truncate, nearly straight, smooth, entirely devoid of spines. Lateral tuft represented by one short hair. A short lamella and several short spines at the apex. (Fig. 25, 6.) Labial plate columnar, lateral teeth strongly curved, upper nearly straight. (Fig. 25, 7.) Air tube short, a little longer than broad (at the base), subconical ; row of pecten of eight curved and spinous teeth, their serrations reduced to a row of fine elongated spicules. (Fig. 25, 8, 8′.) Eight pairs of four-fid hairs are attached to the central region of the tube posteriorly, forming a characteristic cluster. Scales of comb 15–20, each consisting of a thin oval basal plate bordered with fine radiating hairs. (Fig. 25, 10.) Terminal portion of the ninth segment completely encircled by a ring of chitin. Terminal tufts of hairs springing from distinct plates ; the upper tuft of only two pairs of hairs, the lower of seven pairs, the latter feathered. Anal papillæ very long narrow cylindrical, relatively larger than those of any other Jamaican Culicid ; papillæ stiffened with fine spiral chitinous threads. (Fig. 25, 9.)

Pupa : siphons short, apertures bordered internally by many fine branching hairs. Terminal appendages broad, segments nearly equal ; mid rib extending as a fine hair a short distance from the free margin.

OBSERVATIONS.—A few living larvæ of this species, with some of *Culex secutor*, Theo., were sent in September, 1905, by Major Hassard, after whom I have named the species, collected by him from a tank at Newcastle. They were easily distinguished by their pale straw-coloured bodies and dark heads and siphons. The singular group of hairs at the back of the siphon, and the very long anal papillæ at once attracted attention. In January, 1906, I found some specimens in a water barrel at the Government Botanic Garden at Castleton, alt. 500 feet, living harmoniously with *Stegomyia fasciata*, Fab. The adult insects bred from these bit vigorously. I have placed this species provisionally in the genus *Culex ;* the characters of the larval siphons and antennæ clearly point to its being an aberrant form.

5. *Howardina Walkeri*, Theo.—This species is stated to cause much annoyance during the day ; it abounds in woods, breeding in Bromelias. I have already described the larva in my Monograph on the Culcidæ of Jamaica ; the following noteworthy points were omitted : two stout branched hairs are present on the clypeus ; the rays of the hair tufts on

the body are flattened, and feathered along their margins. The pecten rows extend through the whole length of the tube, a branched hair is present on each side, about half way up; the chitinous covering of the thorax and abdomen is densely covered with interlacing dendritic spicules. The ungues of this species are as follows:

♀. All equal and simple. ♂. Fore tarsus unequal, larger claw biserrate, the mid tooth blunt; basal tooth narrow and pointed; smaller claw uniserrate. Mid tarsus unequal, larger claw biserrate, with a blunt mid tooth; smaller claw uniserrate. Hind tarsus, claws equal and simple.

6. *Howardina aureostriata*, nov. sp.—♀. Proboscis black, slightly curved downwards, rather long and narrow, three-quarters length of abdomen. Palpi black, extremity of terminal joint golden-scaled, a few golden scales on the upper median surface of the penultimate joint; under surface of palpi speckled with gold scales. Antennæ black, scattered gold scales throughout its length, especially on the lower joints; about three-quarters length of proboscis. Clypeus black. (Fig. 26.) A narrow median band of golden scales on the centre of the occiput, two broad bands of golden scales on each side of the occiput, the intervening spaces black-scaled; a number of upright forked scales on the nape; scales on the extreme sides of the head silvery. Thorax black-scaled, with seven rows of brilliant narrow curved golden scales, the outermost pair starting from the wing insertions, curving round and bordering the mesonotum laterally and anteriorly; the next pair arise from the preceding near the anterior border of the mesonotum, and run backward, terminating in the lateral lobes of the scutellum; the innermost pair also originate anteriorly, and course backwards, gradually narrowing, over three-quarters the length of the mesonotum. The seventh row arises in the hinder third of the mesonotum, and terminates on the posterior margin of the mid lobe of the scutellum. Prothorax with brilliant silvery scales. Patches of silvery scales on the pleura. Scutellum with a median and two lateral bands of golden scales. Three long hairs on each of the lateral lobes and four on the central lobe. Wings with pale brown scales, the lateral ones long and narrow, median ones short and obconical. First submarginal cell narrower and one-third of its length

Fig. 26.—Howardina aureostriata: ornamentation of head and thorax.

longer than the second posterior cell, its stem less than half the length of the cell; stem of the second posterior as long as the cell; posterior cross vein more than its own length behind the mid cross vein. Halteres with white stems and brown knobs. Abdomen black-scaled, with violet reflections; first four segments with basal bands of golden scales; all segments apically bordered with long white hairs. Triangular patches of silvery scales on the sides of the segments extending ventrally a short distance. Venter with broad basal bands of golden scales on all the segments except the last two. Legs black, with violet reflections, speckled with golden scales, especially towards the extremities; femora golden-scaled on the under surface throughout their whole length, upper surface golden-scaled near the base, a few silvery scales at the apices above forming three spots, especially on the mid and hind legs. Tibiæ unbanded in all the legs. A narrow white basal band on the mid metatarsus. Broad basal bands of silvery-white scales on the metatarsus and first two tarsi of the hind legs. Ungues equal and simple.

Length, 2.5 mm.

♂.—Palpi black, very long and narrow, extending about one-quarter of their length beyond proboscis; three long black hairs at the extremities of the terminal joints; a few on the sides of the penultimate and at the extreme apices of the antepenultimate joints; a few golden scales at the junction of the terminal and penultimate joints; a conspicuous band of golden scales at the lower third of the antepenultimate joint. Shaft of the antennæ conspicuously golden-scaled. The median band of gold scales on the occiput is divided into two by a line of black scales. Abdomen black, segments with long white hairs along the apical borders; all segments with silvery lateral areas; in the last three segments these nearly meet dorsally, forming basal bands. Venter with broad basal bands of silvery scales, among which are a few golden scales along the mid line. Ungues, of the fore leg, unequal, larger biserrated, smaller uniserrated; of the mid leg larger biserrated, smaller uniserrate; of the hind leg simple and equal.

Length, 2.5 mm.

Description of the adult LARVA.—Seen in the breeding jar, it has an almost transparent outline; the head and siphon of a dull red colour. When disturbed it displayed marked activity, retreating with great speed to the dark side of the bottle, and hiding among the algæ. Head nearly

circular, dull red in colour; antennæ transparent, slightly curved inwards, gradually tapering to a blunt apex; lateral hair tuft reduced to a single simple stout hair, one-quarter the length of antenna, arising about half way up the shaft. Apex with four very short spines and a lamella; surface of shaft entirely devoid of spines. A pair of stout simple hairs on clypeus. Mentum a wide angle of 20 rounded teeth. Several tufted hairs on the upper surface of the head near the bases of the antennæ. Thorax and abdomen with scattered tufted hairs, rays 5-20 elongated, jagged at the eyes, some obsoletely feathered; lateral hairs feathered. Comb of twelve stout straight spines in a single row. Air tube subcylindrical, about five times as long as broad (at the base), not swollen, tapering gradually towards the summit. Pecten of two rows of simple elongated spines, 24 in number, extending half way up the tube, with a compound 2–3-fid hair situated at the upper extremity of each, about the middle of the tube. Chitinous plate of ninth segment narrow, saddle-shaped, widely open below, with long spines along its posterior border, a large simple hair at the posterior inferior border (corresponding to the digitate hair in *H. Walkeri*). Ventral group of hairs springing from a diamond-shaped plate. Dorsal group of two pairs, one compound, with short branches, the other pair simple and of great length. Anal papillæ narrowly conical, one-third the length of the longest dorsal hairs. Pupa, siphons long and narrow. Terminal appendages ovate, nearly equally divided by mid rib.

Observations.—The first specimen of this fine species was sent by Colonel Loscombe in September, 1905. Recently three larvæ were found among a number of *H. Walkeri* larvæ collected by Miss Maclaverty from Bromelias, and sent to me alive. They were isolated and developed into adult insects. The pupa stage in both this species and *H. Walkeri* is unusually long—4 days. The chief points of difference between the two species are to be found in the characters of the frontal hairs, hair tufts and siphons. The chitinous covering of the thorax and abdomen of *H. aureostriata* is entirely devoid of the spicules so conspicuous in *H. Walkeri*, which give the latter its dark appearance.

7. *Dendromyia*? nov. sp.—A much-broken specimen of ♀ was sent by Colonel Loscombe, not in a condition to allow of a satisfactory description. The mid legs have triangular basal areas of white scales quite unlike any other species of the genus.

NEW LEPIDOPTERA.—No. 2.

BY ANDREW GRAY WEEKS, JR., BOSTON.

Æthilla Buffumi, sp. nov.—Habitat: Suapure, Venezuela. Expanse, 1.25 inches.

Head and palpi above dark brown, with a few gray hairs; below nearly white. Thorax and abdomen the same above as head; below gray. Antennæ nearly black, with indistinct white annulations at base of each joint. Club, above black, beneath grayish. Legs light brown, with slight white annulations at joints.

Upper side of fore wing dark brown, heavily dusted with grayish at basal and inner marginal areas. The apical area shows none of this dusting except as slight suffusion from basal side. A series of very prominent semi-transparent white spots extends from centre of costa across the end of discoidal space towards lower angle. The first two of these are simply subcostal spots. The next lower is large, covering the entire end of discoidal space. Below this is another large spot, and between these, nearer the hind margin in first submedian interspace, is another but smaller spot. Near the apex are two white subcostal dots. The basal portion of discoidal space has a dark band extending downwards to the centre of inner margin. A similar dark band extends from below the apical subcostal spots to the inner margin just outside the large white spots. These are often indistinct, but show their permanent character in their extension through the hind wing. The marginal fringe is generous, but of the ground colour.

Upper side of hind wing is same in colour as fore wing, but the grayish hairs and scales quite cover the entire surface. A dark band runs from centre of costa across the wing to inner margin, just above the anal angle, following contour of the hind margin. Nearer the base, and barely crossing the centre of discoidal space, is a similar band. These two bands, as above noted, are continuations of the dark markings or bands of fore wing.

Under side of fore wing dark brown. The large white spots are more contiguous, more as a band. The two subcostal dots are repeated. The lower angle area is lighter than ground colour, a branch of it extending upwards through the apical area to the costa.

These markings are not prominent, and are softened by suffusion.

Under side of hind wing dark brown, the dark bands of upper surface being repeated, but showing more suffusion. Inner marginal area lighter than ground colour.

Taken in January, 1900.

May, 1906.

Pamphila Bryanti, sp. nov.—Habitat: Suapure, Venezuela. Expanse, 1.25 inches.

Head and thorax above rich dark brown, with hairs of a somewhat greenish tinge; below light brown or mouse colour. Abdomen above the same; below mouse colour, tending to white along central line. Antennæ nearly black above; below the same, suffusing to light brown towards the club. Legs mouse colour.

Upper side of fore wing rich dark brown above, with five or six white markings. The costa is well dusted with golden scales from base midway to apex. Hind margin has a slight whitish fringe. In apical area are two subcostal white dots. Below these, in centre of wing, are two large white spots, one above the other, and in interspace below, but nearer base, is a much larger white spot.

Upper side of hind wing rich dark brown. From upper angle to anal angle is a line of scattered non-prominent lighter hairs. Hind margin has a slight whitish fringe. The central portion of the wing, covering discoidal space area, has a decidedly dark line in some lights, hardly noticeable on casual inspection.

Under side of fore wing dark brown, without the richness of upper surface. The white spots are repeated, being, as in many of this genus, semitransparent. Costa slightly dusted with lighter scales. Inner marginal area darker than rest of the wing. Hind margin is edged with a black thread.

Under side of hind wing the same colour as fore wing. The line of lighter hairs of upper surface extending from upper angle across centre of wing towards anal angle and parallel to hind margin, appears as a line of interspacial dots, not well defined, but fairly prominent.

Variations.—In a few specimens there is a white dot at end of discoidal space on upper surface of fore wing, and also a third but minute subcostal dot. The white markings show scarcely any variations, however, in the specimens in my collection.

Taken in January, 1900.

Pamphila Chinoba, sp. nov.—Habitat: Suapure, Venezuela. Expanse, 1.12 inches.

Head, thorax, abdomen and legs dark brown above; beneath gray. Antennæ dark brown, with gray on under side at club.

Upper side of fore wing dark brown, with no markings excepting interspacial dark spots along hind margin.

Upper side of hind wing the same as fore wing, excepting that the hind marginal interspacial dark spots are more pronounced, and the edge of the margin is a little lighter than ground colour.

Under side of fore wing light brown, close to mouse colour. The costal area shows a tendency to some lustre. The hind margin is edged with a black thread and a narrow border of gray. The interspacial dark spots of the upper surface of hind margin are repeated, but not prominently. Inner marginal area grayish.

Under side of hind wing brownish gray, mottled with slight interspacial streaks of darker colour. From the costa near upper angle an irregular dark band runs across to near the centre of inner margin. Another branch of this band extends from the same point on the costa down to the anal angle along the hind margin. Outside of this are repeated the interspacial dark spots of upper surface, being black and very prominent. The inner marginal area is light gray, with slight mottling towards anal angle. The hind margin has a dark thread.

Variations.—In many specimens the marginal interspacial dark spots are practically wanting on upper surface. The hind margin is occasionally well bordered with gray hairs. Also there is a suggestion of three subcostal white spots on the fore wing, but none of the twenty specimens in my collection show them at all conspicuously. The under side shows but little variation except in the distinctness and depth of colouring of the dark bands.

Taken in August, 1900.

Achlyodes Melcheri, sp. nov.—Habitat: Suapure, Venezuela. Expanse, 1.35 inches.

Head, thorax, abdomen, antennæ and legs rich dark brown (nearly black) above; beneath a shade lighter.

Upper side of fore wing rich dark brown, nearly black. Towards the apical and hind marginal areas the colouring becomes somewhat lighter, sufficient to show a series of dark interspacial markings along the hind margin. Within this, running from costa towards centre of hind margin, is another series of similar dark markings, forming a band. Still nearer base, and crossing end of discoidal space, is a suggestion of another dark band. These dark markings are so indistinct in a fresh specimen that they would be seen with difficulty. In worn or faded specimens they would, undoubtedly, be quite prominent.

Upper side of hind wing very rich dark brown. From the upper angle to anal angle extends a series of interspacial lighter dashes,

following contour of the margin, and above these, near end of discoidal space, are two slight dashes also. These markings are almost too indistinct to warrant mention.

Hind margins of both wings have a slight fringe of ground colour.

Under side of fore wing dark brown, but lighter and less rich than upper surface. The suggestions of dark markings are repeated. Inner marginal area a little lighter than balance of wing.

Under side of hind wing the same dark brown, the lighter markings of upper surface being repeated. The basal area has a few indistinct mottlings.

A coloured plate of a species like this is absolutely necessary for anything approaching accurate identification, and a plate will be duly published at a later date.

It may resemble *Adelyodes castalus*, Hew., but that has three subapical light spots, which do not appear at all in this, and on close inspection of the scale distribution on under side of hind wing, considerable difference will be noticed.

Taken in November, 1899.

Plestia Kikkawai, sp. nov.—Habitat : Suapure, Venezuela. Expanse, 1.25 inches.

Head, thorax and abdomen above dark brown, with a few grayish hairs. Circles of grayish hairs at base of each segment of abdomen. There is a white dot at base of each antenna. Antennæ dark brown, tip beneath gray. Legs nearly white.

Upper side of fore wing dark brown, with nine white spots or markings, giving the wing almost a mottled appearance. The largest of these is at centre of discoidal space, strongly concaved on marginal side. Below this, in the next two lower interspaces, are two white spots. This row of spots is edged with very dark brown on basal side. Near the end of discoidal space, near costa, is a small white spot. There are two larger white spots or markings in the first and second submedian interspaces, both of them more or less concaved on marginal side. There are three apical white dots. Below them, near lower angle, is a well-defined marking of very dark.

Upper side of hind wing is dark brown. Costa and portion of discoidal space close to base crossed by a heavy white band. Below this near centre of wing, is a prominent white spot, with a smaller one adjoining it. A band of very light brown extends on each side of these spots towards upper angle and inner margin respectively, giving the

appearance of a series of brownish spots. The hind margin, which is somewhat dentated and enlarged at anal angle, has a very irregular and jagged line of light brown, forming a series of interspacial light brown spots, extending from anal angle to upper angle.

Under side of fore wing brown, somewhat lighter than upper surface, and with less lustre. The white spots are repeated, showing more transparency. The lower submedian interspace and the inner marginal area are lighter than the ground colour.

Under side of hind wing brown, a shade darker than fore wing. The white and brown markings of upper surface are repeated, but are all white. The hind margin has a slight whitish line.

Variations.—In some specimens the light brown marginal border or series of interspacial spots noted on upper surface of hind wing is continued upwards across marginal area of fore wing, but it is so variable in its definiteness that it may be considered a distinct band in some specimens, or a mere suffusion in others. The small discoidal spot of fore wing is often joined to the larger one in the discoidal space.

Taken in January, 1900.

SELIDOSEMA UMBROSARIUM, HUBNER.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

In a recent paper on the "Lepidoptera of the Kootenai District" (page 910), Dr. H. G. Dyar remarks of this species: "No specimens; one from Mr. Cockle's collection. The specimen agrees with two in the National Museum, bearing Dr. Packard's original labels, '*Boarmia indicataria*, Comp., Walker's type,' and '*Boarmia umbrosaria*, Hbn., *B. gnophosaria*, Gn,' the specimens originally coming from the Meske and Riley collections. They are males, and show a hair pencil on the hind tibiæ, so I transfer *umbrosaria* to *Cleora*, following Hulst's separation of *Cleora* and *Selidosema*."

In this conclusion I cannot concur, having raised from larvæ, when in Florida, one male and three females of this species, the male having *no* hair pencil, and an exact counterpart of Packard's figure of the type (Mono. Geom., Plate XI, fig. 23), which came from Demopolis, Ala. When at Cambridge I examined this type, which proved that it was correctly placed in *Selidosema*. With it under this name were perhaps twenty specimens, six of which were the true *umbrosarium*, the rest being a species I take frequently in the Catskill Mts., belonging in the genus *Cleora*, and at that time without name in my collection. On my return home I sent one of

these to Mr. L. B. Prout, thinking it might be one of Walker's species. He writes me that it is the *indicataria*, Walk., the type of which is in the British Museum, comparison having been made with it. Here, I think we have the explanation of Dr. Dyar's reference of *umbrosarium* to *Cleora*, but why he should ignore the name *indicataria*, since one was so labelled, I cannot explain. The Nat. Mus. specimens bear Dr. Packard's labels, and as he mingled the two species in his collection, it is quite probable that he distributed them also under one name. *Umbrosarium* is more heavily powdered with black, while *indicataria* is gray, but rubbed specimens of the former might be taken for the latter. Probably they are mingled in most collections, but I find *umbrosarium* rather rare. Recently I have obtained three males and two females from Atlanta, Ga., and am inclined to the belief that its habitat is more strictly southern than is generally supposed, while *indicataria* is found throughout the temperate zone. The localities given by Dr. Packard (Mono., page 441) refer mostly to *indicataria*, and his remarks partly to one and partly to the other species.

Dr. Hulst places *Polygrammaria*, Pack., as a synonym of *Cleora indicataria*, Walk. This is an error. The type in the Packard collection is a male having *no* hair pencil, and belongs to *Selidosema*.

Before me is a male taken in Arizona, which I conclude is this species. It agrees exactly with Packard's description and plate, and in the points to which he calls attention in his remarks. Many of the species of *Alcis*, *Cleora* and *Selidosema* are incorrectly placed, as evidenced by their structure. For instance, *Haydenata* is not an *Alcis*, having *no* hair pencil; Dr. Hulst created the genus *Somatolophia*, which he states is without hair pencil, and places as its type what I believe to be this species. I cannot account for the "tufts on first and third segments" of abdomen, which certainly are present in that specimen, and not in any other which I have examined, except that it is or was freshly emerged, and the tufts had not been rubbed off. I know by experience in raising Geometrids that these tufts are detached by a slight wind or touch. Dr. Dyar some time ago called attention to this genus, and says "both genus and species must fall." Perhaps if *Haydenata* is not an *Alcis*, it may remain as a *Somatolophia*. Until these groups can be studied and rearranged, this had better stand, however, until a decision can be reached by a study of *all*. Again, Dr. Hulst places in the genus *Epimecis*, Hub., our large Geometrid *Virginaria*, Cram. He characterizes the genus as *without* hair pencil in male. If that be correct, then our species is *not* an *Epimecis*, since it *has* a hair pencil.

BOOK NOTICES.

Bulletin of the British Columbia Entomological Society.—No. 1, March, 1906 (Quarterly).

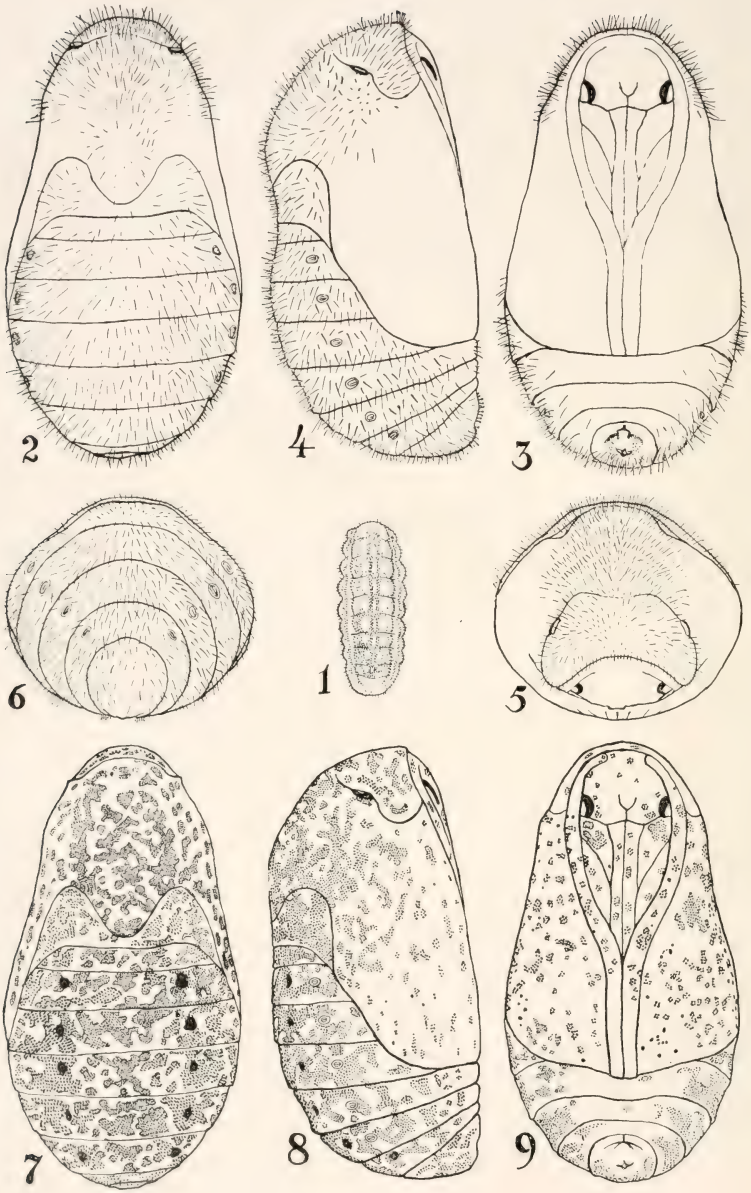
We heartily welcome this first publication by our friends in British Columbia. It is intended to be a medium of communication between the widely-scattered members of the Society in that Province, and will no doubt prove a useful bond of sympathy in each other's work. The four pages now issued give an outline of what has already been done in several orders, and a first instalment of a list of B. C. Coleoptera, comprising the Coccinellidæ; they also furnish the proceedings of the Society, notes and records, etc. The number is useful and interesting, and the publication will soon prove indispensable to all who study or collect the insect fauna of our Pacific Coast Province. There is a vast field of territory to be explored, and important discoveries will soon reward the painstaking investigator.

Report of the Experimental Farms of the Dominion for 1905. Ottawa, 1906, pp. 461.

This goodly volume contains the reports for the past year of the Director and other officers of the various Experimental Farms scattered over the Dominion. While all contain much matter of general interest and of great value to the farming community, we are chiefly attracted to that of the Entomologist and Botanist, Dr. James Fletcher (pp. 159–204), in which he treats of insects affecting cereals, fodder crops, roots and vegetables, fruit crops, forest and shade trees, and in the Botanical part of the Dodder on clover and alfalfa. Among those specially dealt with may be mentioned the Hessian Fly, the Pea Moth (*Semasia nigricana*), the Spined Rustic (*Barathra occidentata*), which has hitherto been considered a rare moth, but whose larvæ appeared in numbers at Ottawa, and did much damage to various plants; its life-history is described, and a plate given showing the moth and caterpillars in different stages. The Larch Case-bearer (*Coleophora laricella*) is another instance of an insect that had not previously been recorded as injurious.

A large number of other insects are more or less fully described, and practical directions for dealing with them are given. We are glad to receive the report so early in the year, enabling all concerned to deal with their insect foes as they appear. Too often it happens, through delays in printing, that reports of this kind come out too late to be of use during the season for which they are intended. We are thankful to Dr. Fletcher for giving us in so concise and excellent a form the results of his labour and experience during the past year.

Mailed May 2nd, 1906.



INCISALIA IRUS, GODT.

The Canadian Entomologist.

Vol. XXXVIII. LONDON, JUNE, 1906. No. 6

STUDIES IN THE GENUS INCISALIA.

BY JOHN H. COOK, ALBANY, N. Y.

INCISALIA IRUS. (Continued from page 144.)

Hymenopterous parasite.—On April 13th, 1906, chrysalis No. 112 gave birth to an ichneumon fly, which Mr. D. B. Young has kindly identified for me as *Anomalon pseudargioli.*

An error corrected.—In 1881, Mr. W. H. Edwards published in Papilio (Vol. I, pp. 150–152) a "description of the preparatory stages of *Thecla Henrici,*" a specimen of which he succeeded in raising from one of a number of eggs laid on plum by an imprisoned female. Dr. Scudder, who failed to find characters warranting the separation of *irus* and *Henrici*, quotes this description in his "Butterflies of the Eastern United States and Canada" as referring to *irus*, and, strangely enough, this error has been copied in all subsequent literature, even where the author recognizes the specific validity of *Henrici*. For example, in Dr. Holland's "Butterfly Book" we read that "an epitome of all that is known (of *irus*) is to be found in 'The Butterflies of New England.' The caterpillar feeds on young plums just after the leaves of the blossom have dropped away." And in the next section, "these (the early stages of *Henrici*) have been described by Edwards in the 'American Naturalist' (Vol. XVI, p. 123). The habits of the larva are identical with those of the preceding species." It so happens that the short note in the "American Naturalist" is merely a second statement of the facts published in Papilio (noted above), from which Dr. Scudder quoted his description and applied it to *irus*. Thus has arisen much confusion as to the propriety of regarding *Henrici* as a species, and misapprehension concerning the larva of *irus* and its food.*

Let it then be understood that the only published account of the early stages of this species, except Scudder's description and figures of the egg, is that found in the "Lépidoptères de l' Amérique Septentrionale" (Paris, 1833), tome 1, p. 102.

*The foot-note on page 142 of the current volume of THE CANADIAN ENTOMOLOGIST (May) is, therefore, a misstatement.

Boisduval's description.—Boisduval has there described the mature larva from the notes of John Abbot as follows: "It is of a yellowish-green, with two broken dorsal lines, a lateral line and eight oblique dashes of a slightly darker green." The figure given bears out the text. The chrysalis, according to this author, is "ferruginous, furnished with little hairs, with two darker longitudinal lines." In the plate it is much too dark to admit of being called ferruginous. It is further stated that "in Georgia this species (larva?) is found, though rarely, on several species of *Vaccinium.*"

In comparing the description of the caterpillar with that herewith given, it must be borne in mind that Abbot evidently regarded the lighter tint as the ground colour, the darker areas as markings; while I have considered the reverse to be the case.

Larva at birth.—Easily distinguished from new-born *niphon* by the inconspicuousness of the short, nearly straight, backward-directed bristles of the laterodorsal series, which in *niphon* are black. Body pale yellow, hairs colourless, laterodorsal bristles a little dusky. Spiracles and dorsal shield pale yellowish-brown. Head yellowish, with a brown labrum and black ocellar fields. Length, 1.26 mm. Exact duration of the first stage not determined accurately, certainly something less than three days.

Second stage.—Body relatively broader, light green; substigmatal fold more pronounced; hairs relatively shorter, more numerous, buff or light brown; head yellow-green. Otherwise, as in previous stage. The larvæ which have been feeding upon pollen are dull orange or brownish, those which have eaten the white carina are very pale green. By giving them only the pistil and stamens for food they regain the usual colour. From 7 to 10 days after birth the caterpillar comes out of the flower and spins a silken mat. Upon this it may remain as much as two days before the skin is cast.

Penultimate stage.—Length just after the second moult, at rest, 3.7 mm.; extended, 4.1 mm. Head brilliant green to dirty yellow-green. Spiracles and dorsal shield a little browner than before. General colour pale green, nearer the violet end of the spectrum than the green of the preceding stage, marked with a weaker tint of the same colour as follows: A slender mediodorsal line extending from the posterior edge of the third thoracic to the anterior edge of the eighth abdominal segment. On either side of this and separated from it by a narrow line of green more dusky than on any other part of the body, a rather broad stripe interrupted by

the incisures. These stripes meet on the anterior part of the third thoracic segment, and are progressively reduced from the fifth to eighth abdominal segments. There is also a line running along the substigmatal fold from the third thoracic to the last abdominal segment, and an obscure spot on each of the first six abdominal segments above the spiracle line. Plate 2, fig. 1, shows the dorsal aspect of the larva immediately after the second moult.

The final moult occurs when the caterpillar has attained a length of about 8.3 mm., but no definite period can be set as the duration of this stage, its length depending greatly upon the health and appetite of the individual. The same is true of the stage immediately preceding pupation, though in general it may be stated that when a caterpillar has had an unusually long penultimate stage the ultimate stage is abbreviated. This last moult is accomplished within twenty-four hours.

Ultimate stage.—Scarcely different from preceding stage. Head gray-green, sometimes more or less yellowish. Dorsal shield inconspicuous, light brown near the incisure, shading to creamy-white on its anterior margin. Mediodorsal stripe, dorsal and substigmatal lines as before. From first to eighth abdominal segment a series of oblique dashes of the lighter tint, one to a segment, meeting the dorsal line just back of the anterior incisure and running downward and backward almost to the spiracle line. These are well developed only on the second, third, fourth, fifth and sixth abdominal segments, where they are sometimes accompanied by a small spot beneath and in front.

Variation.—The larvæ are remarkably constant, the only variation being in the relative values of the two tints. The lighter of these is occasionally so lacking in chroma as to appear by contrast almost white. Usually the difference is slight, and the markings in consequence are obscure. I endeavoured to raise this species on *Vaccinium* to determine how much variation might be due to a difference in the food. My failure was conspicuous ; fifteen caterpillars just from the egg died rather than touch *corymbosum*, *vacillans* or *pennsylvanicum*, and others, further developed, placed upon these plants forsook them immediately. With the same purpose I furnished an equal number of newly-born larvæ with plum twigs. One only found the young fruit to its liking ; the others died without making any attempt to feed. The single exception lived to complete the second moult. The ground colour was a little deeper and of a more bluish-green, the markings nearly white. This is the larva

from which fig. 1 was drawn. It is not typical, and was sketched merely to assist in determining the nature and extent of the markings, which are more or less elusive in ordinary specimens.

Length of larval life.—Only two caterpillars were reared from egg to chrysalis. One born on May 16th pupated June 10th. The other, born May 15th, pupated June 14th. The length of larval existence may therefore be stated to be about 25 or 30 days.

The chrysalis.—As stated previously, the caterpillar forms a rude shelter of such light material as it may be able to find. In nature it doubtless drops or crawls to the ground when fully grown, and searches for a spot suitable for a winter residence. It may wander some distance, for the restless period immediately preceding pupation is several days in length, and as much as a week may elapse between the last meal and the formation of a chrysalis.

The shape of the chrysalis is shown in detail in the plate. Fig. 2 exhibits the dorsal aspect, fig. 3 the ventral, fig. 4 the lateral, fig. 5 the anterior, and fig. 6 the posterior. These are drawn from the same specimen.

In his "Brief Guide to the Commoner Butterflies" Scudder states that the chrysalis has "a slender dorsal ridge on mesothorax." The same statement is made in the descriptions of *niphon* and *augustus*, and in the key which precedes the descriptive text this "slender ridge" is given as a generic character. I fail to find any mention of a ridge in W. H. Edwards's description of the chrysalis of *Henrici*, nor does Hy. Edwards say anything of it when describing what he believed to be *augustus*. I am at a loss to account for the statement. The ridge is certainly not found in *irus*.

As may be seen from the figures, the chrysalis is covered with short hairs, except on the wing-cases, the face, legs, tongue, antennæ and the ventral surface of the abdomen. The whole surface is covered by raised lines, which on the abdomen and thorax are definite in arrangement, and form a fairly regular reticulation, elsewhere they appear like wrinkles in the heavy chitinous shell. This ornamentation is pronounced, and renders difficult the determination of the various brown spots which cover the chrysalis. The thoracic spiracle is dull straw-yellow and conspicuous; the abdominal spiracles may be, for the same reason, visible to the naked eye, or may be inconspicuous because concolorous with their surroundings. The ocellar ribbon is black.

The ground colour is ordinarily brownish yellow, in some specimens with an olivaceous tinge, in others very dull and grimy. This is sometimes nearly uniform over the whole pupa; again, it may be darker on the abdomen. In one specimen the ground colour ventrally is ruddier than it is elsewhere. The surface is marked by irregular blotches of dark brown, sometimes nearly black. These blotches are largest on the abdominal dorsum, where they usually obscure the ground colour to a greater or less extent; on the thoracic dorsum they are moderately large, do not, as a rule, cover the field so completely, and with it stand in sharper contrast. Spots smaller and scattered below the spiracle line on the first four abdominal segments, usually absent on the abdomen ventrally. On the wing-cases, head, tongue, legs and antennæ these markings are reduced to minute, nearly circular, dots (though several may blend together), distributed sparsely. In some individuals there is a series of shallow pits on the first five abdominal segments (possibly wanting on the first), situated midway between the spiracles and the mediodorsal line, one to a segment. These are black when they appear, but seem to be absent in most cases.

When the ground colour is darker and the blotches larger than usual the chrysalis may appear almost black. Figs. 7, 8 and 9 show the maculation in this species.

When the imago emerges in the spring the mesothorax and metathorax of the chrysalis shell split along the mediodorsal line, the prothorax usually comes away entire, and the metathorax and wing-cases to the fourth abdominal segment separate from the abdomen.

A SYNONYM.

In THE CANADIAN ENTOMOLOGIST, March, 1905, I published the description of an apparently new mosquito, giving it the generic name *O'Reillia*. Shortly afterwards Mr. Theobald referred to one of his new genera as having "heart-shaped" wing-scales, and as that was a fairly good description of the wing-scales in *O'Reillia* I suspected I had inadvertently described Mr. Theobald's genus.

Recent correspondence with Mr. Theobald has confirmed me in this opinion, and I hasten to make acknowledgment — *O'Riellia*, Ludlow, must sink as a synonym of *Etorleptiomyia*, Theobald.—[C. S. LUDLOW, Laboratory of the Office of the Surgeon-General U. S. Army, Washington, D. C.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 14.

Work for June.—Caterpillar Hunting.

BY ARTHUR GIBSON, DIVISION OF ENTOMOLOGY, CENTRAL EXPERIMENTAL FARM, OTTAWA.

Everyone interested in the study of insect life eagerly awaits the approach of spring. It is at that time, probably more than at any other, that the keenest interest is shown in the subject by the majority of our collectors. How often, however, one begins enthusiastically in spring to collect insects of *all* kinds, becomes fascinated with the work and within a very short time gathers together a collection worthy of some notice; but, frequently, as the season advances, the interest begins to lag and soon something else takes the attention and the subject is dropped. Many a good beginning is thus ended. The month of June is distinctly the time of greatest interest to study the life-histories of insects. Many collectors, while continually adding specimens to their collections throughout the season, pay little attention to their habits or try to discover any new facts concerning their life-histories. The work of many of our collectors would be rendered more attractive and much more valuable if they would only take time to give a little attention to the early stages of the insects which they collect or study in the perfect state. This short article is merely a plea to beginners or collectors of a few years, to take up some *special* branch of the work in the hope of finding out new facts which, while adding much to their own pleasure, will also be of use to others who may be making a more critical or extended study in the same order of insects.

Taking it for granted, then, that the beginner, or even the collector of some years, wishes to pay special attention to butterflies and moths, late spring is a splendid time to hunt for their caterpillars. There is a fascination about rearing insects to the perfect state which is never experienced in the ordinary collecting of the imagoes. Then, besides, there is the charm of discovering some new fact which was hitherto unrecorded. Many of our caterpillars pass the winter in a half or full grown condition, and if collected in May and June soon become mature and change to the pupal state. Thus in a very short period the beginner will gain much experience which will be of service to him when endeavoring to trace out the complete life-history of a species. Even if his chief desire is to obtain perfect specimens, he will be well repaid with the result of his labours.

June, 1906

As the Rev. Dr. Fyles mentioned in the April popular article, many caterpillars hibernate under pieces of board, flat stones, etc., in fields and open places in woods. Along the grassy sides of railroad tracks there are usually numbers of strips of bark, broken pieces of plank, etc., and if these are examined, many noctuid and arctiid larvæ can be found. At Ottawa, in early May, we place pieces of plank, bark, etc., along roadsides and in open spots in woods. These make excellent traps for larvæ which have hibernated and which, after feeding during the night crawl under such shelters to hide during the day. The traps are visited every day or so, and a great many specimens are found. Larvæ collected in this way should be kept separately in some kind of small jar or tin box. Ordinary small glass jelly jars are very useful for this purpose. The object of keeping each caterpillar by itself is to be sure of its identity when the moth emerges. If a number are put into the same small jar, some will likely be eaten by the others, especially if there is not plenty of food in the jar. Some earth should be put in the bottom of each jar for those larvæ which pupate in the ground. Fresh food should be given every day and care taken to keep the jars clean. When the caterpillars are found, full notes should be taken on their length, appearance and habits. There is a vast lack of definite knowledge on the early stages of many of our common caterpillars, so it is important to take complete notes.

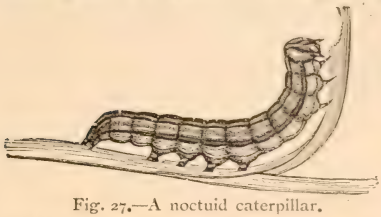


Fig. 27.—A noctuid caterpillar.

If at all possible, at least one specimen of each kind should be preserved for future reference and study. This is best done by inflation, and specimens thus prepared are more valuable than those put in liquids. Proper apparatus may be purchased from dealers in entomological supplies, such as: an oven, in which to dry the empty skins while being inflated; a spirit lamp to furnish heat; some glass tubes drawn out to different sizes at one end; some clips made of watch spring and held to the glass tubes by means of a band cut from rubber tubing; a double rubber bulb with about three feet of tubing attached; and a pair of fine curved forceps. The process, briefly, is to (1) kill the caterpillar in a cyanide bottle; (2) place it on a piece of blotting paper, cover it with a strip of the same paper, and gently press out all the body contents through the anal orifice, using the pair of fine forceps; (3) slip the anal segment over one of the glass

tubes, fastening it with one or two of the spring clips; (4) connect the glass tube to the tubing of the double bulb and inflate the larval skin by gently squeezing the outside bulb, at the same time, with the other hand, holding the caterpillar in the oven to dry. When perfectly dry, the larva should be carefully removed from the glass tube and mounted with shellac on fine wire, one end of which should be first wound several times around an insect pin. Naturally, at first, specimens will be spoiled, but with care good results will soon be obtained. It is best to begin with hairless larvæ.

After the month of June, many caterpillars which have hatched from eggs laid during spring, can easily be collected by beating them off trees and shrubs of almost all kinds. Specially-made beating-nets may be purchased from dealers in entomological supplies, but, for the needs of the beginner, an old umbrella held upside down, does very well. The umbrella should be held beneath part of the plant with one hand, while the larvæ are beaten from the foliage into it, by means of a light stick held in the other hand.

When hunting caterpillars in May and June, cocoons and pupæ of a number of different species of moths will be found beneath boards, dry stumps, etc. The cocoons of the two Halisidota Tussock Moths shown here will often be met with. These latter, which are oval brownish cocoons, if saved and brought into the house will soon give the perfect insects. It may be, however, that some will be parasitized, and instead of producing moths, tachina flies somewhat like the ordinary house-fly, except in size, or four-winged ichneumon flies will be seen in our breeding cages. Such surprises, however, are not always disappointments, as a knowledge of our parasitic, or beneficial, species is of much value. Were it not for these parasitic forms, our native species of injurious insects would soon multiply enormously and quickly destroy all vegetation.

Fig. 28.—*Halisidota caryæ.*

Fig. 29.—*Halisidota maculata*, Harris.

LIFE-HISTORIES OF NORTH-AMERICAN WATER-BUGS.

BY J. R. DE LA TORRE BUENO, NEW YORK.

At every turn, since beginning my studies in the aquatic Hemiptera some four years ago, my attempts to verify some observation have been balked by the extreme meagreness of the information on the subject running all through the field of entomological literature. This lack is far more noticeable with regard to the immature stages of the Cryptocerata and of the aquatic and semi-aquatic forms of the Gymnocerata. As a result, my general work has been in the neglected field of investigations in life-histories and habits, rather than in the more commonly accepted form of labour on classification and systematic phylogenetics. During this period a number of partial experiments, more or less unsuccessful, were made, until in the past year, 1905, four species were completely worked out in the full life-cycle from the ovum to the mature Hemipteron. In the following pages will be given in quite a little detail the results of my experiments in raising *Belostoma fluminea*, Say, *Ranatra quadridentata*, Stal., *Microvelia americana*, Uhler, and *Microvelia pulchella*? Westwood (Uhler).

I.

Life-history of *Belostoma fluminea*, Say.

It is a familiar fact to all collectors of the Hemiptera, that in a number of the genera of the family *Belostomatidæ* (the genera *Belostoma*, Latreille, *Abedus*, Mayr, *Diplonychus*, Laporte, and *Hydrocirius*, Spinola), the ova are borne on the back, covering the hemelytra. Uhler[1] records this fact without committing himself as to the sex of the bug, but for long (in fact, from the very beginning of entomology until within not more than six or seven years) it was held that the egg-bearers were females, and that the ova were deposited on its own back by each female. Authors have even gone to the extent of describing the process at length, going into details of "a long protrusile ovipositor which the insect can extend over her own back."[2]

This absurdity has had a large circulation, although how so flat and broad an insect could carry concealed within itself a necessarily bulky organ such as that imagined, has not to my knowledge been satisfactorily

1. Standard Natural History, Insects, p. 258.

2. Léon Dufour, Essai Mongraphique sur les Belostomides, Ann. Soc. Ent. Fr., 1863, Vol. III, p. 378. Dimmock, Belostomidæ and other Fish-destroying Bugs, Ann. Rep. Fish and Game Comm., Mass., 1886, p. 71. Comstock, Introduction to the Study of Insects, 1888, p. 189; Manual for the Study of Insects 1899, p. 131; Insect Life, 1899, p. 133.

explained. Dr. David Sharp calls attention to Dimmock's hitherto accepted statement, and states that Schmidt found the egg-bearers in *Diplonychus* were all males.[3] It was an American woman, Miss F. W. Slater,[4] who finally established the fact that the female seized the male forcibly and converted him into an animated portable incubator, an observation noted by Dr. L. O. Howard in his Insect Book, p. 279. I have observed the process several times in my aquaria, although not from the very beginning. The female places herself on top of the male, her thorax extending outward and her legs hooked under him ; now, starting somewhere near the middle and sidling along every little while, she works her way around him as she fastens her eggs on his back by means of the waterproof glue secreted for that purpose. The male all the while hangs from the surface, back up, with his legs curled up under him, bravely bearing up under his burden. The egg-bearing male, however, like others of the same sex, dislikes exceedingly this forced servitude, and does all he can to rid himself of his burden. From time to time he passes his third pair of legs over the dorsum, apparently in an endeavour to accomplish his purpose. In general, however, he keeps to his position at the surface, and every now and then moves up and down quite rapidly with a peculiar springy motion. If he is not able to get rid of it, as sometimes happens, he carries his burden till in due time, some ten days or so, all the little ones are emerged, when he at last frees himself from it. This egg-bearing of the male, I imagine, is for the purpose of protecting the ova from the voracious appetites of the adults. I have observed males that succeeded in casting off the unhatched ova seize them and greedily suck them. The females, also, are not free from this vice. A peculiar fact in connection with the phenomena of oviposition is that copulation takes place while the function is being performed, the female interrupting her labours to approach the male.

As development progresses, the ovum swells and lengthens. In emerging, the young nymph escapes through a lid at the top of the egg, and when all, or at least the greater part, of the ova are empty, the male casts off the entire mass of shells, and goes about his business. The same female may again burden him, and so far as aquarium observations go, she deposits several batches of eggs, averaging from 25 to 125[5] each, so she may become the mother of a progeny running into the hundreds.

3. Cambridge Natural History, Insects, Part II, p. 566.

4. American Naturalist, 1899, pp. 931–933.

5. Dimmock says (l. c.) about 175.

From four or five batches of ova numbering about 200 all told, three adults were obtained, which took respectively 43, 53 and 54 days to arrive at maturity, from the date of oviposition, the last being unduly long in the last nymphal instar. It is, therefore, evident that several broods are possible in the course of one summer. There are five nymphal instars, or seven altogether in the full life-cycle from the egg to the adult. The adults overwinter, burying themselves in the mud of their haunts, and they may sometimes be found in warm days in early spring[6] all covered with mud and lethargic, perched on some rock on the shore, in the sun. Oviposition begins in the spring, and continues through the summer. It is not unusual to find in August the adult male with freshly-deposited ova, in company with all the nymphal instars, at one and the same time and place. I have found egg-laden males as early as the middle of May, and as late as the end of August. The last date would allow the young to arrive at maturity by the first week in October, before the weather got too cold. Active adults have been secured as late as the middle of October, and partly torpid ones on a cold day in early November.

Belostoma flumineа is, in common with all water-bugs, a predaceous carnivore, feeding on the juices of insects and snails, and very probably of such small or weak vertebrates as it can overpower. In times of stress it will feed on its own nymphs, which in turn are not averse to preying on each other when hungry, which is always. In my aquaria they are fed flies, which are put in alive, but their sufferings are over as soon as they are seized. The bug apparently injects some paralyzing poison into its victims. Ordinarily, the prey is seized by the raptorial anterior pedes, and at times all three pairs are employed to hold fast some powerful insects or large victim, such as a snail.

This water-bug's favourite haunts are muddy-bottomed ponds, where it lurks among the weeds at the bottom. Sometimes it is found in little bayed-in places in streams, where there is a back-water, with grasses growing into it from the banks, or from the bottom. On one occasion a single individual was found under a stone on the pebbly banks of the Rahway River, near Cranford, N. J.

Belostoma also is parasitized by a water mite, but it does not appear to be injured in any way by its guest.

Both the adult and the nymph obtain their air supply from the atmosphere, by piercing the surface with the terminal abdominal segments In the adult there is a broad pilose band at each side of the abdomen,

6. March 21st, in one instance.

covering the entire width of the connexivum, save for a narrow stripe at the external edge. This band begins about two-thirds of the way up the last connexival segment, and is lost under the edge of the metasternum. On each of abdominal segments 2 to 6 there is visible in this sericeous stripe an oval stigma from which arise tracheæ that lead into the main respiratory system. The spiracles of the first segment are not visible without dissection, and lie in the membranous portion under the metasternal episterna. The main system has its origin in the two strap-like appendages issuing from the dorsum of the 5th abdominal segment, which are evidently the highly specialized 7th abdominal ring.[7] These are each covered at the base by a pilose flap which extends from the segment, and between them lie the genitalia. Near the base and below the outer edge of each of the appendages is a deep-sunk orifice in which lies the great spiracle from which springs the large tracheal trunk of the main system. Each of these large stem-tracheæ goes straight up into the thoracic region, each connecting with the other and with the seven abdominal and three (sec. Schiodte) thoracic stigmata by branches at intervals. The dorsum is covered with short pile, and as it is somewhat hollowed beneath the hemelytra, is apparently employed as a reservoir for storing air. When the bug is at the surface, the end of the abdomen and the hemelytra separate, the hairy ends of the strap-like appendages being visible just under the edge of the membrane, and the air enters here.

The nymphal respiratory apparatus is quite different. In place of the sericeous band, the entire abdomen is thickly covered with long pile; and it appears bright and silvery in the water, and rounded out from the great quantity of air it carries. The connexival spiracles, of which there is one at each segment, are not large, and connect by tracheæ with the main respiratory system. There is a pair of very large spiracles in the cleft sixth abdominal segment, one on each side, from which the main tracheæ rise. The metasternal episterna are produced into long, narrow plates, fringed with long hairs, extending over the first, second and half the third abdominal segments. According to Dr. Sharp,[8] Joanny Martin is of the opinion that these plates are for respiratory purposes. It is possible that they may be used for the storage of air, or perhaps as a means of reducing the quantity held by the pile, by exercising pressure to

7. Dufour in Mém. Soc. Ac. Sci. Liege, 186, p. 197, expresses the guarded opinion that the strap-like appendages of *Belostoma* (=Amorgius) *indicum* are respiratory in their function.

8. Cambridge Natural History, Insects, Part II, p. 567.

force it out. It is certain, however, that they have some connection with the respiratory system. The functions of the pile were long since recognized by Burmeister.[9]

Hereafter follow the notes made from the various instars bred:

Ovum.—Shape: Imperfectly oval, the upper end being the more pointed, the lower rounder. Size: Long., 2 mm.; lat. 1 mm. at widest part. Colour: Light yellowish-brown, shading into dark brown, nearly black at the upper end. When freshly occluded, the ova are of a light yellowish hue. Markings: Under a high power (150 diameters) the corium is seen to be shagreened with very small graining, otherwise entirely free from the more usual condition of ornamentation in the Hemiptera. During incubation the ovum increases in size and changes in form. Just before emergence it is as follows:—Shape: Elongate oval, noticeably tapering from the apex to the base. Size: Long., 3 mm.; lat., 1.1 at greatest breadth.

The ova, as already noted, are deposited by the female on the back of the unwilling male. They are embedded about half their length in the waterproof glue mentioned previously. The preceding descriptions of the ovum are not perhaps as accurate as they should be, since they have been drawn up from alcoholic material. The peculiarity of growth during embryonal development is not unusual, the ova of the various water-bugs I have bred showing it more or less, but none so markedly.[10]

The 200 or more ova occluded in my aquaria had a period of incubation of between six and twelve days. The ova from which were raised the three individuals carried through to maturity, took respectively seven and two eleven days. As a general rule, the greater part of the eggs hatch simultaneously, and the male then sheds its unwelcome burden, the unhatched remainder, if fortunate, emerging a day or two later. The nymph comes out through a round lid that splits off the top of the egg and is attached thereto by a hinge extending about one-quarter the circumference. The process of emergence I very fortunately saw, and the following account is a transcript of my notes made as the little bug came out of its shell. After the round lid is split off, the head is gradually pushed out. By slow successive heaves, the remainder of the body is drawn out until it stands erect, with the chorion as a base, holding the posterior

9. Handbuch, Vol. II, p. 195.

10. Cf. Bueno, Journal New York Entomological Society, Vol. XI, p. 168.

abdominal segments still within it. The legs are still held in the shell, and pressed against the body. A few last heaves set free first the anterior pair, then the other two, and the little bug falls forward. Assisted by its legs, it pulls out of the shell and remains quiescent a moment, then feebly swims away.

First Instar.

Shape: The general shape is much as in the adult. The head is shorter and broader; the distance between the eyes is greater, the eyes themselves being small. The thorax is wider than long, the abdomen is rounded at the tip and covered with pile beneath. The flattened sides are broad, and the deeper abdominal middle is about as wide as one of the sides. The tarsi are all one-jointed,[11] about half as long as their respective tibiæ, and armed with two claws each, those of the anterior tarsi of unequal length, the inner claw being about one-third shorter than the other. The femora are all grooved for the reception of the tibiæ, and sparsely fringed at the edges. The exterior side of the femora is armed with stout spines, which are also found in the tibiæ of the second and third pairs of legs. The antennæ are short, club-shaped, and one-jointed, about one and one-half times as broad at the base as at the apex, and twice as long as the greatest diameter.

Size: Long., 4 to 5 mm.; lat., abd. 2.4 mm.

Colour: Generally somewhat translucent grayish or brown.

Markings: The head has a darker median stripe, produced by the lancets. There are five white spots on the connexival edges, and also near the middle of the body on each side. The legs are more or less banded.

When just emerged the shape of the nymph is more or less narrow and elongated, but in an hour or so it broadens out to the form previously noted. The colour is then a transparent yellowish, and, as in the other Cryptocerata, their transparency in their earlier stages exhibits very plainly the dorsal vessel in motion, as well as the oily globules of the unabsorbed yolk. Shortly after emergence, the young nymph casts off the amnion as a clear pellicle, almost like a diaphanous moulted skin.

When very young, the nymph finds it hard to pierce the surface film. In fact, for some time after hatching, they appear unable to break

11. Dufour (Essai Monographique sur les Belostomides) notes that all larvæ of Belostomids have uniarticulate tarsi.

readily through it to get their prey, so that lack of food prevented me from carrying to the first ecdysis more than six nymphs out of about fifty secured from ova. Of these nymphs, two moulted in seven days, and one each in eight, eleven, twelve and thirteen days respectively, the shorter periods being in late June and August, the longer in early June.

Second Instar.

Shape : Very like the first instar, except that the head is more shaped and the eyes comparatively larger. The antennæ are now distinctly two-jointed and a little more slender, the basal joint being about one-half as long as the second. The legs are as in the first instar, except that the fringing hairs and spines are naturally better developed.

Size : Long., 6 to 7 mm.; lat., 3.4 to 3.7 mm., measured from cast skins and mounted specimens.

Colour and Markings : As in the first instar.

Only three survivors reached the second moult, one in seven, one in five, and the third in six days. My further notes were all made from three individuals.

Third Instar.

Shape : Much as in the preceding instars, except that the abdomen is perhaps a little more rounded posteriorly. The head is still nearer the adult form, with the eyes a little larger. The antennæ are distinctly three-jointed in this instar, still club-shaped, and about twice as long as wide. The wing-pads first appear in this instar. The legs and tarsi are not changed, save that the smaller of the ungues of the anterior tarsal claw is much reduced in length, being barely two-fifths the length of the other. The fringing ciliæ are thicker, and the tibiæ of the third pair, near the tarsal joint, have two parallel comb-like rows of stout bristles. The various spines on the legs are much stouter and better developed.

Size : Long., 8.5 to 9 mm.; lat., 3 7 to 4 mm.

Colour and markings continue much the same, except, of course, for a deepening of the same due to the further stage of development.

The survivors reached the third moult in seven, six and seven days respectively.

The colour after casting off the outgrown integument is greenish yellow, the stomach contents and viscera showing as a darker brownish patch, through which the nearly *black* pulsating dorsal vessel runs. In about six hours the colour changes to the mottled grayish already noted.

Fourth Instar.

Shape: No great variation is shown in this instar, save that the form is perhaps a little more elongate in proportion to the preceding instars. Head is more close to that of the adult, with a slight modification in the eyes. The antennæ, which appeared three-jointed in the preceding instar, show two processes arising from the main stem, which is still club-shaped, somewhat curved outwardly, and three and one-half times as long as wide. They are much lower down the edge of the eye than in the previous stages. The wing-pads are much larger. The legs show a greater development; the fringing ciliæ are more abundant in the second and third tibiæ, and the spines much larger and more regular. The smaller claw of the anterior tarsus is further reduced, being now barely one-third the length of the other. The combs on the third pair of tibiæ are much more apparent, and there is a third broken row above the two others.

Size: Long, 10 to 12 mm.; lat., 6.7 mm.

The colour and markings are still unchanged.

The three nymphs cast their skins for the fourth time in six, five and seven days. Here the colour on leaving the cast skin is green, a very light green, differing in this slightly from the other nymph. In a few hours the normal spotted gray nymphal coloration is attained. The integument even at this advanced period is so transparent that the contraction of the dorsal vessel is visible through the back.

Fifth Instar.

Shape: Differs from adult only in the more rounded abdomen and absence of wings and strap-like appendages. The head is still proportionally broader. The antennæ are now much larger, much lower down the inner margin of the eye, and very distinctly palmate, three and a half times as long as wide. The wing-pads are large. The lower margins of the eyes are provided with long fringing hairs. The legs are the same, with one-jointed tarsi. The shorter claw of the anterior tarsus still persists, very much reduced.

Size: Long., 15 to 17 mm.; lat., abdomen, 8.4 to 8.8 mm.; wing-pads, 8.8 to 9.4 mm.

Colour and markings a little more accentuated, but otherwise unchanged.

The three nymphs arrived at the adult instar, two in eleven and one in eighteen days, but it is to be noted that the latter is an unduly long

period in comparison with that of the other two, and with those elapsing between the other instars. The full life-history of each of the bred individuals is as follows :

	No. 1.	No. 2.	No. 3.
Ova deposited.....	May 20	June 5	August 19
Emergence	" 31	" 16	" 26
1st Ecdysis	June 11	" 24	September 2
2nd "	" 18	" 29	" 10
3rd "	" 25	July 4	" 17
4th "	July 1	" 9	" 24
5th "	" 12	" 20	October 12

The above gives periods for the full development from occlusion of the ova to the adult of 53, 45 and 54 days, the one whose development occurred in midsummer having the shortest period. One of the adults survived in my aquarium till early January. It was sluggish, but finally died as a result, doubtless, of the abnormal conditions under which it laboured.

A most noteworthy fact in the development of *Belostoma flumínea* is the progressive diminution in size of the claw on the anterior tarsi, which finally disappears at the last moult. In the genus *Amorgius* this is not the case—the nymphs have two equal-sized claws on the anterior tarsi, long and well-developed, one of which disappears at the last moult. This may be seen in the nymphs of *Amorgius annulipes*, *A. obscurum* and *A. americanum*. On the other hand, the nymph of *B. Boscii* is single-clawed in the anterior tarsi in the third to fifth stages, which peculiarity it shares with *Abedus breviceps*.

This paper treats only of the more obvious structural differences in the nymphal instars, because lack of material as well as of time to devote to entomology, has prevented the deep study necessary to satisfactorily elucidate many obscure points. What is set down is the result of personal observations, the life and habits have been carefully studied from the living bug, and the anatomical features have been investigated by dissections and microscopical examinations.

In conclusion, I may say that *Belostoma flumínea* is so common a bug, and so easily kept in captivity, that it is possible for any one to breed them and check my results, which I sincerely trust may be done before long.

NOTES ON AMERICAN HEMIPTERA.

BY DR. E. BERGROTH, HIBBING, MINN.

I.

ARADIDÆ.

1. *Aradus concinnus*, Bergr.—Female : Fifth ventral segment as long in the middle as at the sides, with a transverse obtuse-angulated keel a little in front of the almost straight middle part of the apical margin, this keel at the ends coalescing with the apical margin, apical angles of the segment reaching a little beyond the slightly rounded apical margin of the middle part of the sixth ventral segment, which is broader than long, apical angles of this segment nearly reaching apex of second genital segment, which does not project behind apex of abdomen and is half as long as the transverse first genital segment, this more than twice as broad at base as at apex, apical genital lobes shortly prominent beyond apex of abdomen, somewhat distant interiorly, inner margin rounded, apical margin oblique, notched before the middle, dorsal genital segment broadly rounded at apex.

I described this neat little species from a single male from South California without nearer locality. Mr. Heidemann has received both sexes from Palm Springs, Cal. It is the only known American species of the group called *Piestosoma* by Laporte.

2. *Aradus Behrensi*, Bergr.—Of this species, hitherto known only from California, Mr. Heidemann has sent me a specimen from Hood River, Oregon.

3. *Aradus Hubbardi*, Heid.—Of this species Mons. Schouteden has sent me a brachypterous female from Truckee, Cal. (5,800 ft.). In this the corium extends only a little beyond the middle of the second abdominal segment and the membrane is very short, appearing only as a rounded border of the apical margin of the corium, not extending behind its apical angle. I have never before seen a brachypterous imago of this group of the genus.

4. *Aradus cincticornis*, n. sp.—Ovate, male not narrower than female, blackish-brown, basal part and expanded lateral parts of the pronotum yellowish, apical half of scutellum light brown with the apex black, corium, connexivum and under-side of the body mottled with yellow, apical angles of connexival segments yellow, second joint of antennæ sparingly and minutely speckled with yellow, third joint whitish except at base, legs often minutely speckled with yellow, apex of tibiæ testaceous.

Head about as long as the pronotum in the middle, and distinctly longer than broad, longitudinally impressed at the sides with a small tubercle a little in front of and within the strongly-prominent substylated eyes, apical process parallel from the apex to near the base, reaching the middle third part of the second antennal joint, antenniferous spines a little divergent, with a small tooth on the outer margin, antennæ slender, almost filiform, second joint distinctly shorter than the head, longer than the third and fourth joint together, very slightly incrassated at the apex, fourth joint a little longer than the third, rostrum reaching to or a little beyond the middle of the mesosternum. Pronotum more than twice as broad as long in the middle, dilated on the sides, with the greatest breadth behind the middle, sinuated at base in front of the scutellum, lateral margins obtusely angulated, remotely and bluntly dentate, antero-lateral and postero-lateral margins almost straight, disk with the usual six keels, the two inner keels reaching the apical margin, approximated before the middle, external keels much abbreviated, not reaching the middle, median keels reaching the middle of the fore half, ending in a tubercle. Scutellum with a central tubercle, lateral margins raised, nearly parallel towards the base. Hemelytra in the male extending a little beyond the middle of the dorsal genital segment, in the female only reaching the base of this segment, lateral margin of corium ampliated near the base, membrane grayish, with more or less distinct small fuscous spots. Abdomen rather strongly rounded on the sides, lateral margin of connexivum distinctly subangularly prominent just before the apical angles of the segments. Length, ♂, 6 mm.; ♀, 6.5 mm.

Males: Apical lobes of genital segment broad, rounded, with some short and blunt marginal teeth.

Female: Fifth ventral segment a little shorter in the middle than at the sides, apical margin straight in the middle, apical angles extending beyond the middle of the median lobes of the sixth segment, these lobes taken together about as broad at apex as their length, apical angles of sixth segment not reaching the apex of the first genital segment, which is very short, four times shorter than the middle the sixth ventral segment, second genital segment but little shorter than the first, hairy, protruding between the apical genital lobes, the outer margin of which is rounded, with a few obtuse teeth.

ALABAMA.

Allied to *A. similis*, Say, and *Hubbardi*, Heid., but it is more broadly ovate in both sexes, differently coloured, with the lateral margin of the

abdomen more undulate, and with the genital and female ventral segments differently shaped.

5. *Aradus Falleni*, Stal.—Taken by Mr. Heidemann near Washington, D. C., the most northern locality recorded for this species.

6. *Aradus gracilicornis*, Stal.—Mr. Heidemann has sent me specimens from Chiricahui Mountains, Arizona. It was hitherto known only from Cuba.

7. *Aradus niger*, Stal.—This species, although rare, seems to be widely distributed. It is recorded from Colorado by Gillette and Baker under the unpublished name, *A. obliquus*, Uhl.

8. *Aradus Heidemanni*, n. sp.—Elongate-ovate (♀), fuscous, unicolorous, external margins of pronotum, abdomen and basal part of corium very finely crenulate. Head distinctly longer than broad, scarcely shorter than the pronotum in the middle, with a U-shaped impression above and a small, rather acute forwardly-directed tubercle a little within and in front of the eyes, apical process narrowly conical, just a little passing the base of the second antennal joint, antenniferous spines a little divergent, with a distinct tooth on the outer margin, antennæ cylindrical, second joint shorter than the width between the eyes, third joint a little shorter and narrower than the second, fourth joint distinctly shorter than the third, rostrum not quite reaching base of head. Pronotum about twice as broad as long in the middle, scarcely broader than the base of the hemelytra, almost trapezoidal, apical margin truncate, lateral margins a little rounded from the base to a little before the middle, basal margin deeply sinuate in front of the scutellum, disk with four anteriorly convergent keels and a much abbreviated obtuse keel within the lateral angles. Scutellum distinctly longer than the middle of the pronotum, lateral margins reflexed, slightly rounded, apex obtuse. Hemelytra in the macropterous female reaching the base of the dorsal genital segment, corium nearly reaching apex of third segment, somewhat dilated and rounded near the base. Abdomen slightly roundedly prominent near the apical angle of the fifth connexival segment, lateral margins of the sixth segment straight, apical angles obtuse, apical margin broadly truncate, with the female genital lobes much projecting beyond the truncated margin. Length, ♀, 7.8 mm.

Male unknown.

Female: Fifth ventral segment a little shorter in the middle than at the sides, the apical angles reaching apex of the middle lobes of sixth

segment, apical margin trisinuate in the middle; central lobes of sixth segment dilated towards the apex, taken together much broader at apex than the length of the segment, apical margin trisinuate in the middle part, apical angles almost reaching apex of second genital segment; first genital segment twice as long as second, this not protruding between the apical genital lobes, which are rather broadly distant and broader than long, rounded on the inner side and shallowly notched on the outer side; dorsal genital segment almost truncate at apex, scarcely projecting beyond apical margin of last connexival segment.

Astoria, Oregon (coll. Heidemann); Yale, British Columbia (my coll.).

The specimen from Yale is a brachypterous female; it is of a more grayish-black colour, the lateral margins of the pronotum are quite straight, the corium is not longer than the scutellum, rounded at apex, and the membrane is entirely wanting. It much resembles the brachypterous form of *niger*, but is larger, with the antennæ and female genital segments differently shaped.

This interesting species belongs to the subgenus *Quilnus* of Stal, distinguished by the very short rostrum and the trapezoidal pronotum. This subgenus is represented by three species in the palæarctic region (*A. parvicollis*, Stal, from South-eastern Europe and the Island of Cyprus; *A. mirus*, Bergr., from Austria, and *A. brevirostris*, Horv., from Siberia), and by two nearctic species (*A. niger*, Stal, and the above described new species). They live on conifers; unlike other Aradi, which are mostly found under the bark, *mirus* dwells on the twigs and needles of the live trees.

9. *Mezira Jamaicensis*, n. sp.—Elongate, brownish piceous, abdomen ferruginous, apical margin of connexival segments pale yellow. Head about as long as broad, antenniferous spines short, slightly divergent, first joint of antennæ considerably passing apex of head, second joint shorter than first, incrassated towards apex, third joint longer by a half than the second, slender, a little incrassated at extreme apex, fourth joint a trifle shorter than second, postocular teeth acute, not passing the eyes. Pronotum almost straight at base, sides rounded, sinuated before the middle, apical angles rounded. Scutellum slightly carinate in the middle. Hemelytra (♀) reaching base of sixth dorsal segment, corium reaching the middle of second connexival segment, apical margin straight, membrane blackish, with two subconfluent pale spots at base. Abdomen scarcely broader than pronotum. Length, ♀, 6 mm.

Jamaica (coll. Montandon).

Distinguished from the allied species by the almost parallel body and by the colour.

[N.B.—The genus *Brachyrrhynchus*, Lap., must bear the younger name, *Mezira*, Am. S., the first name being preoccupied (Sélys, Aves, 1831). The allied genus, *Coloborrhynchus*, Champ., the name of which is also preoccupied (Owen, Reptilia, 1874), I propose to call *Coloborrhinus*.]

CATALOGUE OF THE GENERA OF THE HEMIPTEROUS FAMILY APHIDÆ.—Second Supplement.

BY G. W. KIRKALDY, HONOLULU, HAWAIIAN ISLANDS.

In the Annales of the Belgian Entomological Society (Vol. 50, pp. 30–6, Feb. 2, 1906), my friend Mr. Schouteden has added a considerable number of genera and species to my list, extending it to 1906.

The number of omissions, even before 1905, is so large, comparatively, that it demands some explanation from me.

1. Some of the remarks, as, for example, the identity of *Aristaphis* and *Pterocomma*, are matters of opinion, though Mr. Schouteden is more likely to be right in this matter than I. These, however, are few in number, and are incidental to all list-making.

2. Some of the omissions were rectified in the first supplement, and it is instructive, as illustrating the difficulty of procuring, or, rather, of knowing of the existence of, some of the papers, that Schouteden did not know of one or two added there by me.

3. I can scarcely hold myself justly responsible for ignorance of many of the papers, as they were in publications inaccessible here, and were not included in any of the usual records. An author can certainly publish where he wishes, but he ought to send copies for record to the Zoological Record, Bericht der Entomologie, or similar works.

The Zoological Record for 1904 was not received here till February, 1906, consequently I lost an opportunity of revising my list.

4. Almost all of the omissions are of European species, the most notable being several species of *Phylloxera*, described by Pergande.

5. In the same Annales, p. 42 (Feb. 27), Mr. Schouteden adds another omitted genus (dating from 1857 !) and makes one or two minor alterations in his own paper.

A FURTHER NOTE ON EUCHŒCA COMPTARIA AND THE ALLIED SPECIES.

BY GEO. W. TAYLOR, WELLINGTON, B. C.

I am glad that Dr. Dyar has given us a note on the *Euchœca comptaria* problem, and that up to a certain point he supports my view.

Without a doubt, he is right in insisting that the type species of *Nomenia* must be called *12-lineata*, Packard.

I am pleased, too, that he has associated Mr. Pearsall's name with another part of the *12-lineata* of authors. I should have suggested this course in the present paper had I not been anticipated.

We are now, I think, all agreed that *E. comptaria*, Walker, is the correct designation for the insect which has hitherto been considered to represent *12-lineata* in the east, and not for the one commonly known as *perlineata*, Pack. This is what I asserted in my first note,[1] and is *not* the view taken by Hulst in Dyar's Catalogue. But Mr. Pearsall now claims, and apparently Dr. Dyar takes it for granted that he is right, that this supposed eastern form of *12-lineata* is really the *perlineata*, Packard, and he brings forward as evidence two specimens now in the Packard collection at Cambridge, bearing labels "*perlineata*" "type."

But, in the first place, it is quite evident from the locality-labels on these insects that they are not really types at all. The original types of *perlineata*[2] were ♂ and ♀ from "Albany, New York, Lintner." These specimens have disappeared. The specimens now in the collection, and which Mr. Pearsall has examined, are two males, "West Virginia, Mead."

In the second place, if these two moths are really *comptaria* rather than *perlineata*, which I cannot yet feel quite sure of in my own mind, and if we accept them as genuine types, which, as I have just shown, they cannot be, even then we cannot allow them to have any weight as against the excellent description[2] and the two capital figures[3] published by Packard.

It is naturally very satisfactory when a type specimen is available to confirm an original, perhaps too meagre, description, but if description and type conflict, then the rule is, or, at any rate, the *practice* is, to give the weight to the *description*. It is the *description*, and that only, that is

1. CAN. ENT., XXXVII., 239.
2. Proc. Bost. Soc. Nat. Hist., XVI., p. 20.
3. Mon. Geom. Moths, Plate VIII., figs. 25 and 68.

published to the whole world, and from the description in the present case entomologists have for 30 years applied the name *perlineata* to the insect Mr. Pearsall now renames *E. exhumata*.

If the description were vague, which it is not, the figures in the monograph are unmistakable.

Dr. Dyar suggests that the *Melanthia condensata* of Walker[4] may be this species, but I am informed that Walker's single type is a specimen of *E. lucata*, as his description would lead one to suppose. Walker's *Cidaria inclinataria*[5] is, as I have elsewhere stated,[6] a synomym of *Xanthorhoe ferrugata*.

I conclude, therefore, that these species must, after all, be listed pretty much as I placed them in my first note, the only difference being that I am now willing to admit our western *Euchœca* to specific rank as *E. Pearsalli*, instead of uniting it with *E. comptaria*, as I was at first disposed to do.

The list will stand:

Nomenia duodecimlineata, Packard.
= unipecta, Pearsall.
Euchœca Pearsalli, Dyar.
= 12-lineata, Auct. (western form).
Euchœca comptaria, Walker.
= 12-lineata, Auct. (eastern form).
= salienta, Pearsall.
Euchœca perlineata, Packard.
= exhumata, Pearsall.
Euchœca lucata, Guenée.
= condensata, Walker.

A CORRECTION.

An inexcusable blunder was committed by me some years ago. On page 791, Proc. U. S. Nat. Mus., XXVI, for 1903, I described an insect under the name *Psinidia sulcifrons*, var. *amplicornis*. For the word *sulcifrons* the specific name *fenestralis* was intended, and should be substituted throughout the description. A. N. Caudell.

4. Cat. Lep. Het., B. Mus., XXIV., 1273, 1862.
5. Cat. Lep. Het., B. Mus., XXVI., 1727, 1862.
6. Can. Ent., XXXVII., 240 and 413.

DESCRIPTIONS OF TWO NEW GEOMETRID MOTHS FROM ALBERTA.

BY GEO. W. TAYLOR, WELLINGTON, B. C.

Xanthorhoe circumvallaria, n. sp. — Expanse, 35 mm.

Palpi and front dark gray, with a plentiful intermixture of brown scales. Thorax dark fuscous. Abdomen above dark gray, beneath lighter gray.

Fore wing: ground colour gray, but almost entirely obscured by blackish-brown scales.

The basal area is darkened by about four parallel wavy fuscous lines; the space between the basal and intradiscal lines is paler and crossed by two dark lines parallel with the basal. Median space uniform blackish-brown, slightly lighter around the large jet-black discal spot; in worn specimens can be seen traces of two darker cross lines, one intra- and one extra discal, within this area; the extra-discal line is black, very irregular, the most prominent outward projection being between veins 3 and 4, this line is followed by a clear white line, then a brownish parallel line, then a gray space (ground colour of the wing), twice as broad as the brown line, next a dark band of the same colour as the median space, extending to the margin and divided into two parts, the outer a little paler than the inner, by a conspicuous white zigzag submarginal line, a marginal row of geminate black dots; fringe checkered gray and brown.

Hind wing: clear white, with a distinct black discal point, and extra-discal black line and a submarginal black band about 2 mm. in width; marginal dots as on fore wing; fringe white, cut with black at the ends of the veins.

Beneath the whole fore wing to the extra-discal line is smoky-black; extra-discal line darker, and the extra basal space is also marked by a darker shade, especially towards the costa; a small dark spot on costa, opposite the discal spot; beyond the extra-discal line is a white band; the rest of the wing is black to the submarginal white zigzag line, which is marked from the costa to vein 3; beyond this line the apical portion of the wing is gray; discal spots on all wings enlarged.

Hind wing marked as on upper side, but the basal area is lightly peppered with dark scales.

Types, two males and two females in my cabinet.

Collected by Mr. F. H. Wolley Dod, near Billings's lumber mills, Millarville, Alberta, on 26, vi, 1898, and 24, vii, 1904.

A fifth specimen from the same source I have sent to the United States National Museum, and others (co-types) are in Mr. Wolley Dod's collection.

Aplodes Hudsonaria, n. sp.—Expanse, 31 mm.

Palpi and front rose-pink, the latter pale on the front edge, but not so distinctly white as in *A. mimosaria*.

Head white above and between the antennæ; collar green; antennæ white above at base, brown towards the tips; thorax bright green; abdomen, first three segments greenish, each bearing a white dorsal spot; rest of the abdomen white. Legs white, anterior tibiæ pink on inner side, and second pair of tibiæ with three pink spots, one at each extremity and one in the middle.

Wings bright green, of the tint of *A. mimosaria*, with two white lines on each wing.

On the fore wing the basal line is irregularly curved, fading out towards the costa; outer line almost straight, not quite parallel to the outer margin (as is the similar line in *mimosaria*), but inclining towards that margin as it nears the costa, which it does not quite reach; costa white above, pink at the base beneath. Hind wing, basal line rather straight, extending from costa to just below median vein, then obsolete; outer line commencing on costa, nearer to the base than usual, curving strongly below median vein, so that if produced, on the same curve, from its vanishing point just below vein two, it would reach the *base* of the wing instead of the inner margin.

In the direction of this line this species differs from all other species of American *Geometrinæ* known to me.

Discal points on fore wings reddish in one of the type specimens, obsolete in the other; on hind wings discal marks are elongated and greenish, as in *mimosaria;* the discal marks on all wings are more evident on the under-sides. Fringes white, spotted with pink.

This species seems to represent *A. mimosaria* in the west, but can be quite easily distinguished by the peculiar outer line on the secondaries and by other points noted in the description.

Types, two males, taken at light on July 7th, 1905, by Mr. A. F. Hudson, at a point on the Red Deer River, 50 miles north-east of Gleichen, Alberta, and kindly presented to me by Mr. F. H. Wolley Dod. A third male is in Mr. Wolley Dod's collection.

Since writing this description, I have seen two female moths, taken at Victoria in August, 1903, by Mr. A. W. Hanham, which appear to belong to this species. The only difference I notice is that the outer line on the hind wing is more distant from the base of the wing in the Victorian specimens than in the Alberta types. One of Mr. Hanham's specimens has been generously given to me, the other remains in his own cabinet.

THE TEGMINAL POSITION IN GRYLLUS.

BY FRANK E. LUTZ, COLD SPRING HARBOUR, LONG ISLAND, N. Y.

In Chap. X of the Descent of Man, Darwin says that when the male of *Gryllus campestris* is chirping, "first one wing is rubbed over the other, and then the movement is reversed." I have carefully observed several hundred males of our native Gryllus, and it seems to me that one tegmen ("wing") is always uppermost. This is, at first sight, a very minor point, but it leads to some rather interesting thoughts.

Among crickets one tegmen when at rest overlaps the other along the median dorsal line. Among the males, as shown below, it is usually the right tegmen that is placed over the left, while among the females there is a much nearer approach to equality of the two conditions. Thus:

Locality.	♀.				♂.			
	Right Uppermost.		Left Uppermost.		Right Uppermost.		Left Uppermost.	
	No.	%	No.	%	No.	%	No.	%
Perkins Cove, Me., Fall 1904...	106	67 5	51	32.5	135	97.8	3	2.2
New Fane, Ver., Fall 1904	14	43 8	18	56.2				
Cold Spring Harbour, N.Y., Fall '04	450	65.9	233	34 1	433	98.4	7	1.6
Gotha, Fla., Fall 1903	53	72.6	20	27.4	34	100.	0	0.0
Gotha, Fla., Spring 1904	119	71.3	48	28.7	83	98.8	1	1.2

During the season of 1905 I had under observation in the laboratory about 100 each of males and females of our native Gryllus. Of these males, when left to themselves, every one kept for the rest of his life the tegminal position he had when he became mature. The females, however, frequently changed theirs. Thus, to take two successive records, which are typical:

No. 190. Matured Aug. 7, **L**; Aug. 19, **R**; Aug. 23, **L**; Sept. 5, **R**; died Sept. 14, **R**.

No. 191. Matured Aug. 5, **R**; Aug. 19, **L**; Aug. 23, **L**; Sept. 5, **R**; died Sept. 9, **R**.

If we take a male after the chitin of the tegmina has hardened, and reverse the tegminal position—say, change **R** to **L**—he will almost immediately show signs of uneasiness, raise his tegmina, and move them

back and forth until he has succeeded in changing them to their original position. If, however, we make the change as soon as he has moulted, and while the tegmina are still soft, the new position will be retained after they are hardened. If we now attempt to change them back to the natural position the cricket will return them to the unnatural one. As far as I could tell, such a cricket could chirp just as well as one whose tegmina had not been tampered with, although he was using the sound-producing organ which would naturally not have been used at all. As indicated above, this organ—the "file" on the under side of the left tegmen—is unused in about 98% of our native Gryllus, and yet it is, to all appearance, as well developed as the other. I have counted and measured the "teeth," studied the venation of the "drum," and, in short, have failed to discover any significant difference between the sound organs of the two tegmina.

In the Locustidæ we find a very different condition. Here there is no file on the right tegmen, and this is *always*—as far as I have seen—carried under the left. However that may be, we have in this very closely-related family, which is really scarcely distinct from the Gryllidæ,* a specialization which is just hinted at (but in the reverse way, *i. e.*, right uppermost) in Gryllus. The constant position of the tegmina is here nearly reached, but the unused sound organ is still intact.

The condition of the females is also interesting. It is easy to see a possible reason why the female should change the tegminal position more often than the male. The tegmina do not overlap so far. But why is it that in spite of this, with the exception of the New Fane, Ver., collection, about twice as many have the right tegmen uppermost as otherwise? Is it a lagging behind the males in specialization and an inheritance from them?

The mention of inheritance brings me to the final and most important point. Is the abnormal left-tegmen-uppermost condition inherited? I am trying to test this, but "left-winged" material is very scarce. If it is inherited, and if isolation is a true biologic factor, there ought to be localities where the "left-winged" condition is common, perhaps even prevalent. I made the unfortunate mistake of asking Mr. C. D. Howe, who kindly sent me what I have from New Fane, Ver., for only females, as at that time I was interested chiefly in females, and so I have not, now, any males from that place. Thirty-two is rather a small

*There seem to me to be more fundamental differences between Gryllotalpa, Grylloides and Gryllus than between Gryllus and the Locustidæ.

number, but as it gives quite a preponderance of left-tegmen-uppermost, I would not be surprised if we have here an isolated colony where "left-wingedness" in the male is common—a survival of a more generalized state, perhaps. I hope to get more material from there. Meanwhile, I would like to ask those all over the country who have opportunity, to examine the male crickets with this simple point in mind. I would be extremely grateful for any such material or information regarding it. It has a bearing on several very important questions.

A FOSSIL WATER-BUG.

BY T. D. A. COCKERELL, BOULDER, COLO.

Among the fossil insects collected at Florissant, Colo., by Judge J. Henderson and Dr. F. Ramaley, of the University of Colorado, is a species of Corixidæ, represented by numerous individuals. It occurred, as Judge Henderson informs me, in the first railroad cutting east of Florissant, a little above the middle of the section there exposed. The shale containing the specimens is very much lighter than that in which the other Florissant fossil insects seen by me are imbedded, and it is believed to belong near the top of the series. It may represent a later period than that in which most of the numerous species described by Scudder lived, and it is certain that the insects now described differ from the three species of Corixidæ described from Florissant.

Corixa Florissantella, n. sp.

Length, 6⅓ mm.; breadth, 2¼ mm.; corium and membrane minutely reticulated, not at all striated; face convex; scutellum concealed by pronotum, except posterior angle; pronotum without visible markings; corium with the margins of the posterior (apical) part rather broadly pallid, and with a broad, more or less distinct transverse dark band just above the beginning of the membrane; just before the dark band is a suffused light band, and in front (basad) of this the corium is dark; membrane black; abdomen ending in a pair of large subtriangular plates, not asymmetrical; swimming (posterior) legs well developed, hairy as usual, extending about ¾ mm. beyond end of abdomen. Length of tegmina, 4½ mm.; breadth about 1 mm.; middle legs projecting about 4 mm. beyond body. Florissant. Following Kirkaldy's table (Entomologist, 1905, p. 234) this would seem to be a genuine *Corixa*, but it lacks pale lines on the pronotum. In Scudder's table of the Florissant species, it falls with *C. Vanduzeei*, Scudd., but that differs entirely in the markings, and probably belongs to the genus *Callicorixa*.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

Toronto Branch.

The 109th meeting of the Toronto Branch was held in the Provincial Museum on March 20th.

The event of the evening was a paper by Dr. Brodie, entitled "Insect Intelligence," in which attention was drawn to some classes of insects which seemingly exhibit an unusual amount of brain development in the will-power shown in the deliberate selection of ways and means. This was followed by a discussion, in which Dr. Abbott gave some interesting examples from personal observation of the skillful way in which insects adapt themselves to abnormal conditions.

The 110th meeting was held on April 17th.

Mr. Williams exhibited some fine Stick insects which he had received from Natal.

Dr. Brodie had a specimen of a hawk-owl, taken in Saskatchewan. This bird, related to both hawks and owls, is not strictly nocturnal, although it feeds at night on insects. Its feet are feeble. It is seldom seen near Toronto, and is not common anywhere. It ranges from Muskoka to British Columbia, always in wooded countries.

Mr. Paul Hahn presented a beautiful little moth, *Orchemia diana*, to the Society, some specimens of which he had collected in Algonquin Park.

Dr. Brodie gave an instructive paper on the Tussock Moth pest. He showed the prevalence of parasitism in checking the increase of the moth, and recommended the collecting and destroying of egg masses, leaving all other cocoons undisturbed. The paper was followed by a discussion.—Elsie Blackmore, Secretary.

ADDITIONAL SPECIES OF MINNESOTA DIPTERA.

Since the printing of the Tenth Annual Report of the Minnesota Entomologist in December, 1905, about 75 additional species of Diptera captured in that State have been named, representing the following families :

Agromyzidæ, Anthomyidæ, Bibionidæ, Cecidomyidæ, Chiromonidæ, Culicidæ, Dolichopodidæ, Drosophilidæ, Empidæ, Ephydridæ, Geomyzidæ, Helomyzidæ, Leptidæ, Lonchopteridæ, Muscidæ, Mycetophilidæ, Ortalidæ, Oscinidæ, Pipunculidæ, Psilidæ, Sapromyzidæ, Scatophagidæ, Sciomyzidæ, Sepsidæ, Simuliidæ, Syrphidæ, Tachinidæ, Trypetidæ.

These species have been listed, and a copy of the list mailed to each Station Entomologist and others known to be interested. Any one failing to receive a copy, and desiring one, can obtain it by writing to Mr. F. L. Washburn, Experiment Station, St. Anthony Park, Minn.

A NEW TORTRICID FROM TEXAS.

BY AUGUST BUSCK, U. S. NATIONAL MUSEUM, WASHINGTON, D. C.

Cydia grindeliana, sp. nov.—Antennæ blackish brown, with short greenish cilia. Labial palpi light greenish yellow, tipped with black. Head and thorax light greenish yellow. Fore wings light straw-coloured, overlaid and streaked with light greenish yellow, and in some specimens with light olive. Costal edge from base to apex with short black and silvery-white strigulæ. Ocellus light shining yellow, edged anteriorly and posteriorly by narrow perpendicular silvery metallic lines, and containing three short black dashes, two on the anterior margin and one on the apical margin; above this is a small area, thickly mottled with dark brown scales, and the whole is surrounded by a narrow silvery line. Termen edged with dark brown ; cilia yellow, with white base, and with dark brown scales, forming a more or less complete marginal line. Hind wings light silvery fuscous. Abdomen silvery fuscous. Legs yellowish, tarsi annulated with black.

Alar expanse : 17–19 mm.

Habitat : *Clarendon, Texas* (October).

Food-plant : *Grindelia squarrosa*, var. *nuda*. U. S. Nat. Museum. Type No. 9804.

The species is nearest *C. olivaceana*, Riley, and *C. griseocapitana*, Walsingham, but lighter, more bright yellow than either. From both it also differs in the dark-tipped labial palpi. From *C. olivaceana*, which it most resembles in general colour, it differs by the continuous series of small costal strigulæ, and in the absence of the oblique olive costal streak at apical third. The strigulæ it has in common with *C. griseocapitana*, but that species has a more dingy whitish colour, irrorate with olive ; that species, type of which I took careful notes on last spring in the British Museum, also has the oblique costal streak at apical third, and has the cilia irregularly dusted with brown. The type of Riley's species is : U. S. National Museum, besides several other specimens. That species feeds on *Solidago*.

The types of the present species were bred by Mr. W. Dwight Pierce, of the U. S. Dept. of Agriculture. The larva feeds in the flower-heads of *Grindelia*, and pupates in a loose cocoon in the same place.

A NEW INJURIOUS PINE-NEEDLE MOTH.

BY AUGUST BUSCK, U. S. NATIONAL MUSEUM, WASHINGTON, D. C.

Recurvaria pinella, new species.—Antennæ dark purple, with silvery-white annulations. Second joint of labial palpi black, with apex and a large spot on the inner side silvery white; terminal joint white, with a narrow black annulation on basal half. Face white, iridescent, sprinkled with darker scales. Vertex and thorax dark purple. Fore wings dark purple, sparsely sprinkled with lighter scales. From basal fourth of costa to basal third of the dorsal edge is a thin, very indistinct and ill-defined oblique white fascia. Along the dorsal edge below the fold are two or three very small tufts of black and white raised scales. Cilia dark purple, apical part with a still darker blackish basal line along the edge of the wing. Hind wings light fuscous; cilia yellowish. Abdomen bronzy fuscous; female with protruding horny, hairy ovipositor. Legs purplish black, with white bars; tarsal joints tipped with white.

Alar expanse: 9–10 mm.

Food-plant: *Pinus ponderosa*.

Habitat: *Manitou, Colorado, Prof. C. P. Gillette.* U. S. N. M. Type No. 9811.

The larva mines the leaves of *Pinus ponderosa* exactly in the fashion of the common *Paralechia pinifoliella*, Chambers, in the Eastern States, and is, according to Prof. Gillette, of some economic importance.

Prof. Gillette, who has shown me beautiful drawings of this insect and its work, will shortly give a fuller life-history.

In coloration the species comes nearest to *Recurvaria nigra*, Busck, but that species has the thin cross line at apical third of the fore wing instead of at basal third as in the present species. Venation and oral characters typical.

ANNOUNCEMENT.

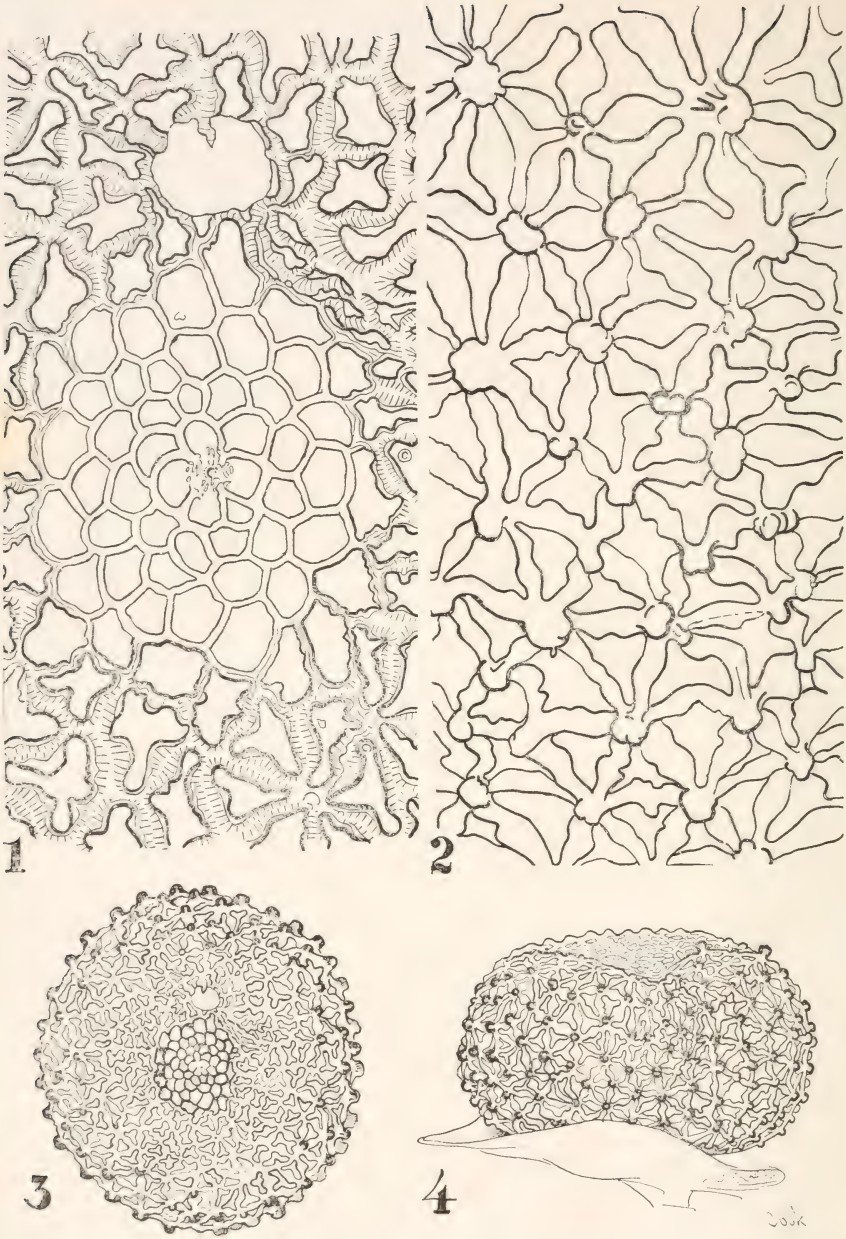
The Rev. C. J. S. Bethune, editor of THE CANADIAN ENTOMOLOGIST, has been appointed Professor of Entomology and Zoology at the Ontario Agricultural College, Guelph.

All communications intended for him personally, or as editor of this magazine, should be addressed, after June 11th, to

REV. PROFESSOR BETHUNE,
ONTARIO AGRICULTURAL COLLEGE,
Guelph, Canada.

Books and Exchanges (as hitherto) to The Entomological Society of Ontario, London, Canada.

Mailed June 5th, 1906.



INCISALIA AUGUSTUS.—THE EGG.

The Canadian Entomologist.

VOL. XXXVIII. LONDON, JULY, 1906. No. 7

ENTOMOLOGICAL SOCIETY OF ONTARIO.

REMOVAL TO GUELPH.

On the 4th of May the President of the Society, Mr. J. D. Evans, C. E., Trenton, sent a circular letter to all the members of the Council of the Society, asking for their opinion respecting the proposed removal of the headquarters of the Society from London to Guelph. In a letter, dated June 18th, he announces that he has received replies from all the members, and that the vote stands in favour of the removal *eleven*, opposed to it *four;* one member abstained from voting. He adds: "Since the vote in favour of the move stands nearly three to one, I hereby declare the decision for the removal to Guelph carried."

The Society's lease of its present quarters in the Public Library Building, London, terminates its second year on the 1st of September next, and at that time another tenant is prepared to take over the premises and relieve the Society of the remainder of its term; to this arrangement the Library Board has given its consent. The removal will therefore be carried out during the latter part of August.

The Ontario Agricultural College at Guelph will provide, rent free, suitable accommodation for the Society's library and collections, etc. To the former there will be assigned a special section in the fireproof Massey Hall Building, and the collections will be kept entirely distinct from those belonging to the College. All the property of the Society will be entirely under the control of its own officers, and subject to any regulations that its Council may draw up. A written agreement to this effect between the College and the Society will be duly executed.

Much regret is felt by all the members of the Council, and no doubt by the members of the Society in general, that the headquarters should be removed from London, where they were established a few years after the formation of the Society in 1863. Unfortunately, interest in entomology has almost entirely died out in London, and there seems to be no one there available for the supervision and care of the library and collections. The sections also in Botany, Ornithology, Geology and the Microscope have, one after the other, ceased their active operations, and no meetings

of any of them have been held during the last two years. At Guelph, on the other had, there is a large and active list of members. During the first and second years of the College course attendance at lectures on Entomology is compulsory, and during the third and fourth years some of the students specialize in the subject, and make it a serious and scientific study—these naturally become active members of the Society, and continue their connection with it after they leave college and scatter over the country. There will also be at Guelph a continuity of work and interest through the permanent staff of a Professor, Lecturer and Demonstrator of Entomology. The books and specimens will be much more largely consulted and the usefulness of the Society greatly extended. It is therefore believed that the contemplated removal will be in the best interests of the Society.

STUDIES IN THE GENUS INCISALIA.

BY JOHN H. COOK, ALBANY, N. Y.

II.—*Incisalia augustus.*

Time of flight.—Species single brooded; butterflies to be found during late April and early May. I have taken the male as early as the 11th of April, but usually the first imagoes appear about the 20th. They become abundant by the first of May, after which time the females may be observed ovipositing, and the males rapidly disappear. After May 10th worn individuals only are seen, some of which may endure even to the end of the first week in June.

Oviposition.—Eggs are laid during the first two weeks in May (and probably later) on *Vaccinium vacillans* and *Kalmia angustifolia*. Since the caterpillars will eat *V. corymbosum* and *V. pennsylvanicum* quite as readily as *V. vacillans*, it is probable that these plants also are oviposited upon. I have been unsuccessful in attempts to induce the larvæ to feed upon any other of the indigenous *Ericaceæ* or *Rosaceæ*.

When placed upon *Kalmia* the egg is tucked in between the individual buds of the fascicle, often so deeply that the buds must be broken apart to find it. When placed upon *Vaccinium* its position depends upon how far open is the flower bud selected by the female. If she finds it possible to thrust her ovipositors between the green bud and the brown shelly scales, or between the outer and inner series of the latter, she does so, and the scale, springing back to its former position, completely covers

and conceals the egg. When, on the other hand, the bud is scarcely open, the egg is placed upon the outer face of the bud scale, near the stem. A confined female, after ovipositing on all the buds of the plant supplied, placed her two last eggs on the petioles of leaves. Ovipositing takes place in the middle of the day, and each female disposes of about sixteen eggs. In nature, these are placed singly, never more than one on any plant, but unlike *irus*, the female of this species will often oviposit several times within a radius of a few feet.

The egg.—Turban-shaped, top slightly depressed; micropyle, a rosette of cells, still further depressed; bottom flat or irregularly indented. Sides ornamented with low rounded bosses in series, each connected with the nearest ones surrounding it by slightly elevated ridges, which are broadened out midway between the bosses, and are exceedingly irregular in outline, a character which serves at once to distinguish the egg from that of the congeneric species (as far as these are known). Cell walls of bottom and of micropyle narrow, clear-cut and of uniform width. At the edge of the micropyle the walls broaden abruptly, and the sculpture of the surrounding area is similar to that of the sides, except that the bosses are wanting. Plate III, fig. 1, shows the micropyle and depression; fig. 2, a part of the surface sculpture from the region of greatest diameter; and figs. 3 and 4, the top and side. When first laid, the egg is light green, with a faint bluish tinge, which disappears within a few hours. The colour gradually changes as the embryo larva develops, from light green to yellow-green, to greenish-yellow, and, finally, from four to thirteen hours before the birth of the caterpillar, to chalky-white.

Period of incubation.—On May 10th, 1905, I obtained sixteen eggs from a female confined over *Kalmia*. These were laid between 10 a.m. and 3.30 p.m., and all hatched between 2 and 11 p.m. on May 15th. An egg laid on *Kalmia* at 11.11 a.m., May 3rd, 1905, hatched during the early morning of May 9th. Another, laid on *Vaccinium* at 11.38 a.m., May 8th, 1905, hatched between 10 a.m. and 2 p.m. on May 11th. Only one egg was secured this spring. It was laid at 1.20 p.m., May 14th, and hatched at 3.25 p.m. on the 18th. From these instances it will be seen that the period of incubation varies from three to almost six days.

The larval stages.—I have been unable to discover eggs on the food plants, except when I have seen the female oviposit, and although I have spent many hours in the search, I have never found a newborn larva.

It is altogether probable that the feeding habits at this time are such that the presence of the caterpillar on a plant is not indicated by any obvious mark. My knowledge of such habits is, in consequence, more or less speculative, and based upon what I have learned from watching the larvæ bred in captivity and upon analogy with the related species.

When the caterpillar finds itself upon *Vaccinium* it ascends to the corolla, and eats therein an irregular hole just above the calyx. Through this it crawls well into the flower and feeds indiscriminately upon the style, stamens and maturing ovary. Its resemblance to the lower part of a stamen is striking, and when at rest on one of these it is practically invisible. I once sought for twenty minutes for one which I knew was somewhere in a cluster of three flowers, and eventually discovered it head down on a stamen. By the time the protecting and concealing corolla has fallen the larva has turned green, like the young fruit into which it bores in a manner similar to that of *Henrici*, as described by W. H. Edwards. From this time it feeds openly, probably mostly at night, concealing itself during the day beneath a leaf or among the berries. Larvæ in advanced stages may be sought with some success on rainy or cloudy days on plants, the fruit of which has been attacked in the manner characteristic of fruit-eating *Lycænidæ*, although many such evidences will be discovered for every caterpillar found. In three years I have found two; Mr. Harry Cook has also secured two in the same length of time.

I have found it impossible to raise this species on *Kalmia* in the laboratory. The young larvæ can eat only tender tissues, and *Kalmia* dries out very quickly. Nor have I ever been able to discover a caterpillar on this plant. Therefore, I know nothing of the feeding habits when it is selected as the food plant. Certainly some variation in coloration is to be looked for in individuals which have fed from birth on *Kalmia*, if it is the petals which are eaten, for the brilliant green of those taken from *Vaccinium* would render them conspicuous amidst the rosy flowers of the laurel. Curiously enough, the "*Vaccinium* larvæ" refuse to eat *Kalmia*.

I have been unable to detect more than two moults in this species, although it would seem reasonable to expect a third, as *irus*, *Henrici* and *niphon* moult three times. It scarcely seems possible that with the precautions taken I should have twice failed to note one of the moults,

yet there is some discrepancy in the records of the two larvæ which I succeeded in raising from the egg. Since one cannot be positive about what was *not* seen, I give the records just as they stand in my notes—records of what *was* seen. For brevity I use the word "up" to indicate that the larva has taken its position on the silken mat preparatory to moulting; the word "off" to indicate that the skin has been cast; and the word "final" for the last mat to which the chrysalis is to be attached. Where the time is marked with an asterisk it indicates exactitude; elsewhere approximation made by halving the time which elapsed between observations. As these were taken at least four times daily (often more), there is no possibility of any approximate record being more than three hours out of the way.

		FIRST MOULT.		SECOND MOULT.		PUPATION.	
	BORN.	UP.	OFF.	UP.	OFF.	FINAL.	PUPA.
1905.....	May 11. Noon.	May 15. 9 p.m.	May 16. 1.30 p.m.* (2.8 mm.)	May 20. 10.07 p.m.*	May 22. 4 p.m. (5 mm.)	June 6. 1 am.	June 9. 3 a.m.
1906.....	May 18. 9 p.m.	May 21. 7 p.m.	May 23. Noon* (2.3 mm.)	May 30. 9 p.m.	May 31. 9 p.m. (4.6 mm.)	June 7. 9 p.m.	June 10. 3.26 a.m.*

It will be seen that the 1905 specimen developed rapidly, completing two moults in eleven days and attaining a length of 5 mm. The ultimate stage was unusually long (more than two weeks) and the larva was three days on its mat before it became a chrysalis. On the other hand, the 1906 larva grew to a length of only 4.6 mm. in thirteen days, was only a week in final stage, and became a chrysalis in two days and six hours.

When nearly full-grown the caterpillar seems to prefer a diet of leaves, and for a day or two refuses the fruit, after which it crawls to the ground, and though several days may pass before it finds a spot suitable for the change to chrysalis, it does not again touch food. The extreme length attained is 17 mm., but the larva decreases rapidly in size during this walking tour, as is the case with *irus*.

Pupation.—The caterpillar pupates among the dried leaves and dead grass on the ground, selecting a dark coloured surface in some protected spot. No "cocoons" were formed by any of those raised by me, although they were offered the same opportunities accorded *irus*, which does form such a shelter.

(To be continued.)

A FEW NOTES ON THE LEPIDOPTERA OF 1905.

BY E. F. HEATH, CARTWRIGHT, MANITOBA.

The season was a very unsatisfactory one for Lepidoptera in my neighbourhood, so far as quality was concerned, and yet several new species turned up—new, that is to say, to this district—and there were sundry other occurrences which I think may be worthy of record.

All Rhopalocera were very scarce; even the more common and abundant species in general did not occur in the tenth part of their usual numbers. I added, however, a species to my collection, *Debis portlandia*, Fabr., of which I took a couple, and saw one or two more. Of the other genera—especially the "Blues" and "Hair Streaks"—very few were to be seen.

Hardly any of the spring species of Noctuids came to my sugared trees, and except a few hibernated specimens, I got little or nothing, until the black currants came into bloom. From them I netted a nice series of "Sharks" of several species, but, strange to say, I did not get a single *Cucullia intermedia*, Speyer, which used to be rather plentiful, to the exclusion of the other species of the genus. *Peridroma saucia*, Hbn., came out in great force later on, and in endless variety. It was accompanied by *Dargida procinctus*, Grt., of which I took fifteen or sixteen examples—five or six times as many as I have seen during all my previous years of collecting. I think I recollect having seen it stated that when, three or four years ago, the larvæ of *saucia* did so much damage in British Columbia, the larvæ of *procinctus* were also found with them.

Orthosia paleacea, Esp., as it has hitherto been called, or *O. discolor*, as I should prefer to call it, was fairly abundant, and I took a very nice series showing considerable variation, and with them a few of *O. punctirena*, Smith. I have only recently become aware that this moth, *paleacea* (or *discolor*) was supposed to be the equivalent, or identical with the *Euperia fulvago* of the English lists. I had it in my English collection, and I have not seen here a single specimen identical in colour. Besides, *fulvago* has the black spot in the reniform, whereas *discolor* is without it. The specimen given in Dr. Holland's Moth Book must surely have been of European origin, or, if not, our moth here in the Northwest must be a different species to what occurs further south. I might here suggest of what great assistance it would be if the American entomologists, who are so busy altering generic names that have been in use for, in some cases, a hundred (and even more) years, would kindly publish a list of

their alterations in dictionary form, so that when in doubt as to a name one could see at a glance to what their new names referred, At the same time, I think they are making a mistake in these alterations for the sake of some priority of a name given by some obscure writer, and which has been ignored by his immediate successors, to whom his work must have been known, and which possibly is the less appropriate of the two, and how do they know that the rest of the world will adopt their nomenclature?

To say the least, it does not appear to me to be the way to popularize entomology, which should be one object, if not the chief one, of all writers on the subject. People get rather disgusted when, having acquired one set of names, they have, for no real scientific or economic reason, to forget them and learn others.

At light I hardly took anything, although besides a lamp in the window I had constantly a "trap" in an excellent situation. The trap was built from a sketch given me by my kind friend, Mr. Merrick, of New Brighton, Pa., and judging from the number of flies that came therein to an untimely end, and one catch of moths, it would have been most effective had there been any number on the wing during the season generally. I took no Sphingidæ, no Arctians, very few Geometers, and hardly a Micro, and none of the other species which come to light. The flies consisted chiefly of Tipulæ and various water-flies, with a few Ichneumons. If any of my readers would care for such "small deer," I should be happy to save them on receiving instructions how to preserve them. The legs of "Daddy Long Legs" seem to have a rooted objection to remaining attached to their parent bodies, and I should be glad to know how best to deal with them for safe transit.

There was a fair show of *Xylinas* up to almost the middle of September, and I took for the first time that nondescript, *capax*, G. and R., which seems to be stuck on to the *Xylinas* for want of a better place, though I should much question if it really belongs to that genus. After this date the nights became so cool that nothing hardly showed at treacle, and the late autumn species were conspicuous by their absence.

A *Polia* was tolerably abundant, which has hitherto gone by the name of *confragosa*, Morr. I sent some to Mr. Wolley Dod, and he, doubting the correctness of the determination (which was not mine, by the way), sent some to Dr. Dyar, who says he thinks they are a new species between *medialis*, Grote, and *contadina*, Smith.

Some of the *Catocalas* were fairly represented. I took a long series of *briseis*, Edw., showing considerable variation, and a *relicta* so dark that I think it would pass muster as *elda*, Behr. *Crataegi*, Saund., and *preclara*, G. and R., appeared as usual, but the other species I have taken here were almost entirely wanting.

One curious thing happened during the season's collecting, which is, perhaps, worth recording: On the evening of Aug. 29th I was rather late in starting out with my treacle pots to refresh my baited trees, and the moths were just on the wing. At the first tree I came to I saw a large moth flying about which seemed new to me. I rushed back to my house, a few yards away, for my net and killing bottle, but the moth was gone when I got back, and I saw him no more. The next night, on the same tree, and at the same time, to a very few minutes, the same moth—or another—was there again, and I secured it, and it turned out to be *Homoptera lunata*, Drury, its first appearance here.

I have almost forgotten to mention that *Aletia* (*Alabama*) *argillacea*, Hbn., has been prospecting in Manitoba to see if the cotton plant—or a suitable substitute—was comprised in its numerous productions. One pioneer fell a victim to its taste for sweets, and now adorns my collection.

ON THE OCCURRENCE IN CANADA OF *HIMERA PENNARIA*, LINN., A EUROPEAN GEOMETRID MOTH.

BY GEO. W TAYLOR, WELLINGTON, B. C.

A Geometrid moth sent to me for determination by Dr. Fletcher some time ago, appears to belong to the well-known European species, *Himera pennaria*, Linn. This species has not previously been recorded as occurring on this continent, and there is always the suspicion of a mistake when a species belonging to the Old World fauna is reported in America for the first time; but this species is distinctly labelled as captured by Mr. L. Fanshawe at Tamarisk, Manitoba, and I see no reason to doubt the genuineness of the record.

The genus *Himera* (= *Colotris*, Hubner) is a peculiar one, and contains only this single species.

A peculiarity by which it may be easily recognized is the presence of a little tuft of hair arising from below the base of each antenna, and dropping across the eyes to the middle.

In our lists this genus should be placed immediately before *Ennomos*.

NOTES ON THE CLASSIFICATION OF THE PERLIDÆ.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

In a recent paper on the genus *Chloroperla* I divided this genus, as it had been used, into two genera; neither of which being a true *Chloroperla*, I proposed the names *Isoperla* and *Alloperla*. The character I used in this division was one proposed by Prof. Needham to separate the *Perlini* from the *Nemourini*. This is the condition of the median vein near the base of fore wings, whether united to the radius, or running parallel to the radius. In *Isoperla* the median vein is as in *Perla*, running parallel to the radius; while in *Alloperla* the median vein is like the *Nemourini*, united at an angle to the radius. From a study of the anal region of the fore wings I find that these two genera can be more readily known by another character, and that in this respect also *Alloperla* is related to the *Nemourini*. This new character is the condition of the two lower branches or veins from the anal cell; in *Isoperla* (type *C. bilineata*, Say), these two veins arise separately, as in *Perla*, but in *Alloperla* (type *C. imbecilla*, Say), these two veins unite before the cell, or rather, there is one forked vein instead of the two simple ones. This latter condition obtains in the *Nemourini*. The application of this character places the same species in *Isoperla* and *Alloperla* as does the condition of the median vein.

In the *Nemourini* there is one forked vein from the lower part of the anal cell, the outer branch bowed up to form an elongate cell. In the *Capnini* there is but one vein from the anal cell below, and this is not forked, a character which will distinguish this tribe from other *Perlidæ*. In the Trans. Amer. Ent. Soc., XXVI, p. 240, 1900, I separated the *Capnini* by the unbranched radial sector; there are, however, one or two exceptions, or rather, the apical venation is confused so that the radial sector appears branched; the character of the anal region seems to be constant, and the two characters together will readily distinguish this tribe.

The *Pteronarcini* differ from all other *Perlidæ* in having a series of cross-veins in the anal region; as well as by their approximate anterior coxæ.

In the true *Perlini* there are two simple branches from the anal cell below; but in two species of *Acroneuria (pacifica* and *nigrita)* there are three branches, or one simple and one forked vein; in some other species of *Acroneuria* one of the branches is sometimes forked.

Several authors have divided the *Perlidæ* into two sub-families, *Perlinæ* and *Nemourinæ*, but the structure of *Alloperla*, related to *Perla*

by well-developed setæ, to *Nemoura* by venation, shows that the differences between these groups are not of more than tribal value. If it is desired to have two sub-families, I think that the *Pteronarcini* should be opposed to all other *Perlidæ*. However, I think that four tribes better express the relationships of the groups.

These four tribes may be tabulated as follows:

1. Well-developed setæ present ..... 2.
   Setæ obscure or absent; one branched vein from the anal cell of fore wings; no series of cross-veins in anal region; never greenish or yellowish species ..... *Nemourini.*
2. A series of cross-veins in anal region of fore wings; anterior coxæ approximate ..... *Pteronarcini.*
   Rarely a series of cross-veins in anal region; anterior coxæ widely separate ..... 3.
3. Anal cell with two simple or one branched vein from below; radial sector generally forked beyond or at anastomosis; median vein usually running parallel to radius in base of fore wings ..... *Perlini.*
   Anal cell with but one unbranched vein from below; radial sector usually not forked beyond nor at anastomosis; median vein running into radius much before base ..... *Capnini.*

The genus *Perlinella*, like *Chloroperla* of authors, contains some discordant species. The type of *Perlinella*, *P. trivittata*, has some cross-veins in the anal field, a character of *Pteronarcys*. The *Perla placida*, Hag., and some allied forms, differ from *Perlinella* in lacking such cross-veins, and are more allied to *Perla*. They differ from that genus, not only in venation, which is allied to *Perlinella*, but also in having much longer setæ, with very elongate joints. Therefore I place *P. placida* as the type of a new genus, *Perlesta*, distinguished by the characters given in the table below. The *Perlinella frontalis*, Bks., differs from *Perlinella* and *Perlesta* in having a forked vein from the anal cell, instead of two simple veins; it is therefore related to *Alloperla*. It differs from *Alloperla* by having a series of cubital cross-veins in the hind wings, and by the two-branched radial sector of fore wings. It therefore belongs to new genus *Paraperla*.

All the species originally placed in *Chloroperla* are now placed by European authorities in *Isopteryx*, a later genus; therefore *Chloroperla* replaces *Isopteryx*.

The genera of *Perlidæ*, now known to occur in the United States and Canada, may be distinguished by the following tables of the four tribes. A

few names may require explanation. *Perlodes* replaces *Dictyopteryx*, as the latter name is preoccupied in Lepidoptera; *Neoperla* replaces *Pseudoperla*, the latter having been used previously in the Orthoptera. Prof. Klapalek, who has seen the type of *Taeniopteryx fasciata*, Burm., places it in the genus *Rhabdiopteryx*.

Pteronarcini.

1. In the fore wings the space between the basal part of radial sector and median vein shows some complete or incomplete cross-veins; larger species ..... *Pteronarcys.*
   This space is free from cross-veins; much smaller species ..... *Pteronarcella.*

Perlini.

1. Many cross-veins between apical branches of the radial sector, as well as between radius and radial sector ..... *Perlodes.*
   Few, if any, cross-veins between apical branches of the radial sector, and rarely between radius and radial sector ..... 2.
2. Several cross-veins in middle part of fore wing beyond the anastomosis ..... *Acroneuria.*
   Few, if any, cross-veins in middle part of fore wing beyond the anastomosis ..... 3.
3. Ocellar triangle more than twice as broad as long; usually one cross-vein between radial sector and radius, near end of latter .. *Isogenus.*
   Ocellar triangle not twice as broad as long; only abnormally a cross-vein between radius and radial sector beyond anastomosis ..... 4.
4. But two ocelli ..... 5.
   With three ocelli ..... 7.
5. Setæ but little longer than width of abdomen; the pronotum much broader than head ..... *Peltoperla.*
   Setæ much longer; pronotum barely broader than head ..... 6.
6. Ocelli about one or two diameters apart; joints of setæ only one or two times longer than broad ..... *Neoperla.*
   Ocelli four or five diameters apart; joints of setæ three to five times longer than broad, often a cross-vein in anal field of fore wing ..... *Atoperla.*
7. A series of cross-veins in anal field of fore wing; a series of cross-veins in the cubital area of hind wings; setæ not longer than abdomen ..... *Perlinella.*
   No cross-veins in anal field of fore wing, except those to form the cell ..... 8.

8. From the anal cell there extends below one vein, which is soon forked; the median vein unites with radius near base, usually but one cross-vein beyond the end of subcosta.....9.
From the anal cell there extend below two simple veins; the median vein near base runs closely parallel to radius for some distance..11.
9. No veined anal field in hind wings; only two cross-veins in cubital area of hind wings; small greenish species.....*Chloroperla.*
A veined and folded anal field to hind wings.....10.
10. A series of cross-veins in cubital area of hind wings; radial sector of fore wings forked twice beyond anastomosis.....*Paraperla.*
No series in cubital area of hind wings, only one near base and one near tip; small greenish or yellowish species.....*Alloperla.*
11. Hind wings with but two cross-veins in cubital area, one near base, one near tip, small greenish or yellowish species.....*Isoperla.*
Hind wings with a series of cross-veins in cubital area; radial sector usually twice-forked.....12.
12. Setæ longer than abdomen, joints of middle three to five times as long as broad, first fork of radial sector much beyond anastomosis.....*Perlesta.*
Setæ shorter than abdomen, joints of middle only one or two, rarely three, times as long as broad.....*Perla.*

Nemourini.

1. Second joint of tarsus subequal to first.....2.
Second joint of tarsus much shorter than first.....4.
2. An oblique cross-vein beyond end of subcosta.....3.
No oblique cross-vein beyond end of subcosta.....*Tæniopteryx.*
3. Radial sector forked twice beyond anastomosis; in fore wings the cubitus, beyond cross-veins, bends up to form an elongate cell.....*Tænionema.*
Radial sector forked but once beyond anastomosis; the cubitus not forming an elongate cell.....*Rhabdiopteryx.*
4. An oblique cross-vein beyond subcosta; wings not involute.*Nemoura.*
No cross-vein beyond subcosta; wings involute.....*Leuctra.*

Capnini.

1. Apical submarginal space with cross-veins.....*Capnura.*
No such veinlets.....2.
2. The space beyond discal cell longer than discal cell.....*Arsapnia.*
This space much shorter than discal cell.....*Capnia.*

NEW SPECIES OF NOCTUIDÆ FOR 1906.

No. 2.*

BY JOHN B. SMITH, SC. D., NEW BRUNSWICK, N. J.

Cyathissa quadrate, n. sp.—Ground colour creamy-white, more or less washed with luteous, the maculation black, contrasting. In type it is like that of *percara*, and the lines are identical in course; there is the same basal dash, and the quadrate pale blotch on the costa in median space is very similar. But there is no green shading whatever in the wing, the black markings are more intense, more contrasting, usually broader, and, in the median space, they extend below the costal pale area, shading into smoky-brown at about the middle of the wing. There is also a costal black patch just beyond the t. p. line, which is not present in the older species. The secondaries have the dark median band and dusky outer border well defined, whereas in *percara* these are entirely absent or only indicated. Beneath, the body is deep sooty-black, with the legs contrastingly white-marked.

Size as in *percara*.

Habitat.—San Bernardino Ranch, Cochise Co., Arizona; 3,750 feet; in August. F. H. Snow.

One male and two females in good condition. This species bears almost the same relation to *percara* that *ochracea* does to *pallida*, and the replacement of the green by luteous will serve to distinguish them, as well as the heavier and more extensive black markings. There is no question of discoloration of green, such as is sometimes seen in *percara*.

Cyathissa ochracea, n. sp.—White with a slight creamy tinge. Disc of thorax with ochraceous scales in some specimens. Primaries, basal space white, shaded with ochreous along the inner margin, two black dots on costa. The median space is defined by broken, irregular, narrow black lines, is ochraceous, fading out to white on the inner margin, and with a large quadrate white blotch on costa; this with sharply-defined black-edged margins. Beyond the t. p. line on the inner margin is a large blackish blotch, which does not quite reach the inner angle. Elsewhere the space beyond t. p. line is rather irregularly shaded with ochreous. Secondaries white, tending to a dusky shading toward anal angle. Beneath white; primaries with maculation of upper side faintly reproduced; secondaries with a narrow extra-median line and a small discal spot.

*No. 1 is in the Journal of the N. Y. Ent. Soc. for March, 1906.

Expands: .75–.90 inches = 19–22 mm.

Habitat.—Baboquivaria Mts., Pima Co., Arizona, July 15. O. C. Poling.

One male and three females in good condition. The maculation is like *percara*, but the green is replaced by ochreous, and there is no longitudinal mark at base. The ochreous shade is not a discoloration.

Cerma marina, n. sp.—Ground colour dark, brownish-gray, with black powderings, which, on the primaries, are reinforced by amethystine scales in all the lighter areas. Head and thorax with gray-tipped scales, disc of patagia with greenish admixture. Primaries so powdery as to obscure the ordinary maculation; but in general the median space is darker than the rest of the wing, and the claviform and space between reniform and orbicular are darker still and nearly blackish. Basal line gray with black scale edges, extending across the cell. T. a. line gray, outwardly oblique, broken, irregularly sinuate, outwardly marked by black scales. T. p. line outcurved over cell and incurved below, irregularly denticulate, outwardly pale shaded. A broad but rather indefinite median shade band crosses between the ordinary spots and darkens the outer part of the median space. S. t. line pale, punctiform, irregular. A series of black terminal lunules and fringes cut with gray. Claviform clouded with blackish, of moderate size. Orbicular large, round, incompletely defined, marked by green scales. Reniform large, upright, centrally constricted, incompletely defined, marked by greenish scales. Secondaries dirty-gray or whitish, fringes darker, an incomplete submarginal line toward anal angle. Beneath smoky, paler toward base, a common extra-median darker line and the inception of a median band on costa of all wings.

Expands: 1.00–1.05 inches = 25–26 mm.

Habitat.—So. Arizona, Poling; Santa Catalina Mts., Pinal County, Arizona, Dr. Barnes.

One male and one female. The species is darker and more obscurely marked than any of those previously described, except *galva*, Strck. The latter is from New York and lacks all green, recalling *olivacea*.

Setagrotis dolens, n. sp.—Ground colour somewhat bluish ashen-gray. Head and thorax concolorous, vestiture hair and elongate flattened scales. Abdomen a little more yellowish. Primaries with a tendency to a brownish shading outwardly. Basal line a dark dot on costa and median vein. T. a. line single, nearly upright, a little outcurved in the interspaces. T. p. line single crenulate, obscure or altogether lost, somewhat

acutely bent on costa and even below. An obvious smoky median shade is oblique from costa over reniform and darkens the outer part of median space. S. t. line pale, broken, very even, accompanied by a somewhat rufous smoky shade. A series of small terminal lunules. Fringes a little rufous. No claviform. Orbicular concolorous, round when visible, indicated by orange scales. Reniform darkened by median shade, and more or less edged with orange scales. Secondaries in the male gray; in the female smoky-yellowish, in all with a discal lunule. Beneath, primaries gray, with an incomplete smoky outer band. Secondaries whitish, powdery, with a round discal spot and an incomplete punctiform outer band.

Expands: 1.35–1.60 inches = 34–40 mm.

Habitat.—Arrowhead Lake, British Columbia, June 8–15; Beulah, Manitoba, Aug. 28.

One male and two females in good condition in Dr. Barnes's and my own collection. The species is allied to *Quebecensis*, and like that resembles a *Carneades (Euxoa)* of the *Bostoniensis* type. It differs from the eastern species in the less obvious maculation and in the outward rufous shadings. There is quite a bit of variation indicated since the male has nothing except the reniform and median band that is at all obvious.

Euxoa esta, n. sp.—Head, thorax and primaries smoky black, with minute yellow powderings. Collar with a deeper velvety-black median line, dorsal tuftings of thorax and edges of patagia with some white scales. Primaries with all the maculation obscured, yet most of it traceable on good specimens. Usually the median lines are traceable by yellow atoms more or less black-edged each side, the t. p. being most obvious. S. t. line punctiform, also marked by yellow atoms and velvety-black defining scales. There is a very narrow pale line at base of fringes. At base is a black longitudinal mark. Claviform narrow, black-margined, sometimes with yellow atoms, extends not quite to centre of median space. Orbicular moderate in size, round or oval, concolorous, ringed by black and yellow scales. Reniform kidney-shaped, moderate in size, with a ring of yellow scales margined by black. Secondaries in male yellowish-white at base, becoming smoky outwardly; in female smoky throughout, but paler basally; the tendency is to a smoky discal spot. Beneath, primaries whitish to extra median line, smoky and powdery beyond; secondaries

whitish, outer marginal region powdery ; a small discal spot and a distinct outer transverse diffuse line or band.

Expands : 1.30–1.48 inches = 32–36 mm.

Habitat.—Wellington, British Columbia, July 30, Aug. 14 and Sept. 13. Theodore Bryant.

One male and three females, all in good condition, two of them from Dr. Barnes's collection, two from my own. This is allied to *velleripennis*, which I have from the same locality, but is not so black, and the vestiture is somewhat more roughened. The type of maculation is much the same, but in the old species there is no yellow powdering. *Punctigera*, which is also allied, is a smoother species, in which there is a brownish tinge, and the yellow margins to the ordinary spots are broader, not made up of elevated individual scales.

Hadena bultata, n. sp.—Ground colour a reddish luteous, powdered and overlaid by a darker, more brownish colour, in which there is a vague rosy or coppery tinge. Head and collar concolorous, somewhat deeper in shade, collar and patagia well marked, but not up-lifted, dorsal tuftings small. Primaries with all the usual maculation obvious, but variably distinct, never contrasting. Basal line single, narrow, irregular, outwardly oblique. T. a. line single, irregular, as a whole a little outcurved, tending to obsolescence, sometimes with a paler preceding shade. Median shade line a little smoky, outwardly oblique through the bottom of reniform, then forming almost a right angle, evenly oblique to the inner margin. T. p. line smoky, single, almost crenulate, outwardly bent over cell and evenly oblique below. S. t. line of the pale ground, a little sinuate, feebly defined. A series of dusky terminal lunules, beyond which is a yellow line at the base of the fringes. Claviform of good size, broad, reaching the median shade, concolorous, outlined in coppery red-brown. Orbicular round or nearly so, moderate in size, outline and centre a little darker than ground. Reniform large, a little constricted, darkened by the median shade. Secondaries smoky-yellowish with a glistening surface, a vague smoky discal spot and extra median line. Beneath yellowish, with a smoky exterior line and discal spot on all wings.

Expanse : 1.40–1.50 inches = 35–38 mm.

Habitat.—Glenwood Springs, Colorado, end of June and early July. Dr. Barnes.

Two males and two females in fair condition. The species is unlike the usual type of *Hadena*, but is an ally of that series in which the secondaries are slightly excavated below the apex. The range of variation is in the greater or less powdering which may reach a point making it difficult to distinguish the markings.

Mamestra tuana, n. sp.—Ground colour dull, smoky-brown, powdery. Head and collar somewhat paler, crossed by darker transverse lines. Tips of collar and thoracic tuftings paler. Primaries with all the maculation complete, not contrasting. Basal line yellowish-brown, margined with black, lunate, and interrupting a thick, diffuse basal black streak. T. a. line geminate, outer portion black, inner brown, included space lighter brown, outwardly oblique and outcurved between the veins. T. p. line geminate on costa, outer portion lost over cell, inner black, oblique to the cell, then forming a distinct obtuse angle evenly to the inner margin. Beyond the t. p. line the wing is paler to the narrow, sinuate s. t. line, which is of the ground colour, usually followed and sometimes preceded by black marks. A slender black terminal line followed by a yellowish line at base of fringes, from which the fringes are cut interspaceally, the yellow being interrupted by a brown interline. There is a somewhat obscure median shade line, which is oblique over the reniform and runs close to the t. p. line below the cell. Claviform concolorous, distinctly black-ringed, short and broad, sometimes with a dusky shading across the cell. Orbicular of good size, round or obliquely oval, a little paler, incompletely black-ringed. Reniform upright, of good size, broadly oval, a little darker than ground, obscurely black-ringed, the outer border margined with white, forming the only conspicuous feature in the wing. Secondaries smoky-fuscous, a little paler at base, fringes with a yellow line at base. Beneath smoky, powdery, with a well-defined common extra median line and a well-marked discal spot on secondaries.

Expands: 1.15–1.32 inches = 29–33 mm.

Habitat.—Huachuca Mts., Arizona.

Three males and eight females, in fair condition, all of them from Dr. Barnes, and all without date. The species is rather a well-marked one, between *noverca* and *Goodelli*, with the wing form of the latter rather than the former. The little touch of white on the reniform lightens up the wings materially.

Mamestra sareta, n. sp.—Ground colour bluish ash-gray, head and thorax somewhat powdery. Front crossed by a black transverse line

below antenna. Collar with a black median line ; patagia with a black submargin. Thoracic and abdominal tuftings well marked. Primaries with a yellowish or brownish shading in the median cell above the claviform, sometimes confined to the reniform only. Basal space paler gray costally, the area limited inferiorly by a somewhat irregular black streak, which extends almost to the t. a. line. T. a. line outwardly oblique, outcurved, reaching the inner margin at or just before its middle, even, geminate, outer part black, slender ; inner smoky-gray, obscure. T. p. line rather even, geminate, mostly lost over the cell, with a sharp, well-defined incurve in the submedian interspace, where it is black and preceded by a white lunule. S. t. line punctiform, irregular, variably marked by irregular preceding dashes and following shades, best marked by a whitish lunule opposite hind angle. A lunate black terminal line, followed by a slender yellowish line at the base of the fringes, which are cut with black and gray. Claviform narrow, pointed, extending across the cell, accompanied by a black shading that forms a more or less conspicuous bar. Beyond the t. p. line the dusky shading is continued through the interspace, cut by the lunule of the s. t. line. Orbicular narrow, oblique, elongate, usually open to costa, black-ringed and usually a little paler than ground. Reniform large, oval, a little drawn in centrally from the outer side, somewhat oblique, black-ringed, more or less shaded with yellowish or brownish. Secondaries white in the male, with a mere trace of blackish edging, whitish in the female, becoming smoky outwardly. Beneath whitish, primaries smoky on disc ; secondaries with a trace of a punctiform outer line and discal spot.

Expands : 1.00–1.12 inches = 25–28 mm.

Habitat.—Arizona ; Huachuca Mts., May 8–15 ; Wilgus, Cochise Co.; Gila Co., May 14 and June ; Minnehaha, Yavapai Co., Aug. 20 and Oct. 2–5.

Nine males and four females from Dr. Barnes, seven males and ten females from Mr. Hutson. The species resembles *vicina* in general appearance, and some of the larger examples might, if alone, be readily referred to that species ; but with the series at hand, the smaller size, brighter blue-gray colour and clear white secondaries of the male stand out conspicuously and make for an easy recognition of the species.

Orthodea gigas, n. sp.—Ground colour a rather bright brownish-red over luteous, the markings smoky. Head and thorax concolorous, collar and patagia marked, a small dorsal tuft obvious anteriorly. Primaries

without strong contrasts, more or less powdery and dotted, all the maculation traceable. Basal line geminate, smoky, somewhat diffuse, a little outcurved. T. a. line geminate, broken, the two portions not entirely parallel, a little oblique outwardly and somewhat outcurved in the interspaces. T. p. line often broken, the inner more or less lunulate or crenulate, outer more or less punctiform, as a whole rather abuptly bent opposite upper end of cell, and then almost evenly oblique to the margin. In some specimens a supplemental series of dusky and yellow venular dots crosses the s. t. space. Median shade broad, almost the darkest part of the wing, oblique from costa between ordinary spots, then parallel with and close to the t. p. line. S. t. line punctiform, yellowish, preceded by a dusky shade, which really marks the line, and this dusky shading sometimes extends beyond, into the terminal space. Sometimes only the veins are darkened and there is a checkered appearance. A series of small dusky lunules is at the base of the fringes which have a dusky interline. Claviform absent. Orbicular round or oval, not well defined, concolorous. Reniform moderate in size, kidney-shaped, incompletely defined, usually a little gray-powdered. Secondaries dark smoky with yellow fringes. Beneath smoky, varying in shade, with a distinct extra median, and less marked s. t. common transverse lines, and on the secondaries a distinct dark discal spot.

Expands: 1.40–1.60 inches = 35–40 mm.

Habitat.—Southern Arizona, Poling; Huachuca, Arizona; Santa Catalina Mts., Pinal Co., Arizona, Aug. 26–30.

Three males and three females in good to fair condition, all from Dr. Barnes. The species is altogether unlike any of our previously-described forms, and was at first sight associated with *Pronoctua*, as probably a form of *phyllophora*. It belongs in that section of *Eriopyga*, as used by Hampson, in which the front is unmodified, anterior tibiæ are unarmed, abdomen not tufted, vestiture of thorax scaly hair, male antennæ ciliate, femora clothed with thin hair, and cell of male with long fine decumbent hair.

Himella fiosca, n. sp.—Ground colour a mottled-dull smoky-gray, in which all the maculation is obscured. Front of head tending to become a little paler; collar pale-tipped. Primaries so mottled and the usual lines so broken and little contrasting that it is difficult to trace them. The geminate basal line is usually well enough marked. T. a. line seems almost evenly oblique outwardly; but is with difficulty followed out. T. p.

line a little outcurved over cell and even less incurved below, almost entirely lost. S. t. line yellowish, almost evenly parallel with the outer margin, sometimes emphasized a little by darker preceding scales, and this is the best marked line on the wing. No claviform. Orbicular round or nearly so, small or moderate in size, somewhat paler-ringed. Reniform of good size, upright, centrally a little constricted, incompletely pale-ringed, with a tendency to a few white scales at the lower outer angle. Secondaries smoky in both sexes, rather darker in the male. Beneath smoky, more or less powdery, secondaries paler, both wings with variable outer lines and discal spots.

Expands : 1.06–1.20 inches = 26–30 mm.

Habitat.—Huachuca Mts., Arizona. Dr. Barnes.

Six males and two females in fair to good condition. An undersized female from Wilgus, Cochise Co., may belong here, but offers some points of difference that make it doubtful. The species looks more like an *Orthodes*, but has only a slight covering of silky hair in the cell on the under side, and the wing-form and general habitus is not unlike *contrahens*.

Tæniocampa fractura, n. sp.—Ground colour a pale reddish luteous. Head and thorax immaculate. Primaries with all the lines broken, but easily traceable. Basal line geminate, smoky, marked on the costa and through the cell. T. a. line geminate, nearly upright, outer line sometimes nearly complete. T. p. line almost parallel with outer margin, punctiform, geminate, outer series incomplete, dots of inner series closely placed. S. t. line pale, preceded by a dusky shading, only a little irregular. A series of obscure terminal dots and a yellow line at base of fringes. No claviform. Orbicular round, concolorous, incompletely outlined by blackish scales. Reniform barely traceable, large, upright, concolorous, indicated by scattered scales. Secondaries dull, very pale, smoky-yellowish, scarcely darker in the male. Beneath with a reddish tinge, secondaries paler, with a variably marked outer line, incomplete on secondaries, and on the latter a small discal spot.

Expands : 1.08–1.12 inches = 27–28 mm.

Habitat.—Huachuca Mts., Arizona. Dr. Barnes.

Four males and two females in fair condition. The species by its simple male antennæ and general appearance is allied to *peredia* and *furfurata*, but is more simply marked and somewhat broader-winged.

Tæniocampa indra, n. sp.—Ground colour luteous, in the female tending to smoky-brown. Head and thorax without markings. Primaries with basal and median lines geminate; in the male more or less obviously defined by smoky or blackish scales, in the females better marked by the pale filling, which in the male is concolorous; the darker the wing, the better the pale stands out. Basal line a little outcurved, extending to submedian vein. T. a. line outwardly oblique, a little curved and a little outcurved in the interspaces. T. p. line abruptly bent on the subcosta, then a little sinuate, but on the whole nearly parallel to outer margin; the outer portion of line is punctiform, and occasionally, when the dark shading extends inward, the entire line appears crenulate. An obscure, diffuse median shade over reniform, and below it close to the outer line. S. t. line of the pale ground, relieved by dark preceding shades or powderings, a little irregular, reaching the margin at or just within the inner angle. A series of small blackish terminal lunules and a yellow line at base of fringes. Orbicular somewhat irregular, moderate in size, concolorous, scarcely relieved by yellowish scales. Reniform of good size, broad, kidney-shaped, or a little constricted, ringed with yellowish and dusky filled; secondaries smoky, paler at base, and altogether paler in the male. Beneath powdery, primaries smoky on disc, with a crenulated outer line; secondaries paler, with an incomplete outer line and a discal spot.

Expands: 1.10–1.30 inches = 27–32 mm.

Habitat.—Arizona: Minnehaha, Yavapai Co., Sept. 26 to Oct. 3; Huachuca Mts., Chiricahua Mts., Wilgus, Cochise Co.; Tonto Basin, Gila Co.

Eighteen males and twenty-four females, of which all save nine were sent in by Mr. Hutson, and the remainder came through Dr. Barnes. The species is allied to *oviduca* and *Utahensis*, differing from the eastern form by its larger size and less stumpy primaries, in addition to differences of maculation, and from the western in the distinct s. t. line, completely filled reniform and altogether more powdery appearance.

Perigonica punctilinea, n. sp.—Ground colour a creamy-gray, tending to luteous, more or less powdered with black or brown atoms. Head and thorax immaculate. Primaries ranging from almost uniform powdery to a fairly well-marked form, in which all the ordinary maculation is traceable. Basal line single, upright, punctiform, marked on the veins only. T. a.

line single, upright or a little curved, punctiform, marked by dots on the veins and by powdery atoms in the interspaces. T. p. well removed outwardly, best marked on the costa, then with an abrupt outward bend over cell, evenly curved toward the inner margin, punctiform on the veins as usual. The median shade is marked by an outwardly oblique trigonate blotch, the point of which reaches the bottom of the reniform, and below this the shade is inwardly oblique, diffuse, and tends to become obsolete. S. t. line marked on costa by a dusky triangular preceding blotch and, below that point, partly by a narrow yellowish line and partly by preceding or following powderings. A punctiform line at the base of the fringes. Orbicular wanting. Reniform narrow, upright, dark-filled and forming the most persistent of the markings, traceable in all specimens. Secondaries smoky with paler fringes. Beneath, powdery, with a punctiform outer line and a discal spot on all wings.

Expands : 1.26–1.40 inches = 32–35 mm.

Habitat.—Southern Arizona, April 15–30. Poling.

Two males and five females in fair to poor condition. This species has less conspicuously angulated and pointed primaries than any other of the genus, and approaches *Tæniocampa pectinata* somewhat in habitus. The general appearance and the type of maculation suggest *Perigonica*, however, and for the present I consider the reference to that genus warranted.

Lythrodes minutissima, n. sp.—Head white in front. Thorax dull ochreous, with disc and patagia obscurely white-lined. Primaries pale creamy-yellowish, interspaces marked with ochreous to or a little beyond the middle, and from that point the veins are white-marked, the line extending through and cutting the fringes. Secondaries whitish. Beneath, primaries pale smoky-yellowish, secondaries white.

Expands : .56 inch = 14 mm.

Habitat.—Yavapai Co., Arizona, May 21, 30, 31. Hutson.

Three male examples in good condition. This, while not the smallest in expanse, is the slightest of the Heliothids known to me, and is almost Pyralidiform in appearance. The darkening by the ochreous interspaces through the centre of the wing is characteristic.

Campometra protea, n. sp.—Ground colour dull yellowish-brown, overlaid by darker or lighter scales, ornamentation dark brown or black. Head usually darker brown. Collar with a broad brown band across the middle, or the lower half of the collar is dark. Thoracic disc, including

patagia, crossed by alternate pale and dark bands, the contrasts varying. Abdominal rings narrowly dark banded. Primaries, basal line single, black, accompanied by a pale shade line, extends obliquely inward across the costal area. T. a. line broken near the centre, dislocated, forming rather a band than a line, and this band may be black or brown, or brown with black margins. The median line is black, narrow, a little irregular and somewhat curved, and this usually marks the division between the paler basal third of the wing and the darker outer half of the median space. T. p. line single, black, irregular, well and somewhat acutely curved over the cell, reaching the inner margin a little beyond the middle. S. t. line pale, irregular, forming a somewhat well-defined jog below the apex, preceded by dusky or black shadings. A lunate or almost scalloped terminal black line followed by pale or yellowish venular marks and a dusky interline on the paler fringes. The orbicular is a black point, which may or may not be obvious. The reniform is an irregular, nearly upright, black line, beyond which is a diffuse whitish or pale shading. Secondaries with basal two-thirds of a somewhat paler ground than primaries, crossed by more or less obvious brown or blackish lines to a distinct narrow black line, which borders a dusky band that is outwardly limited by the black, pale bordered s. t. line. Terminal line and fringes as in primaries. Beneath an even, dull, deep smoky-brown, with a common darker extra median line, within which are three less obvious similar lines, and a discal spot on all wings.

Expands: 1.20–1.48 inches = 30–37 mm.

Habitat.—Yavapai Co., Arizona, May 21–31. Hutson. Babaquivera Mts., Pima Co., Arizona, in September. Poling. Readington, Arizona. Dr. Barnes.

A series of over 50 examples is before me at present, and I have had nearly as many more for comparison, all from the same general faunal region. No two examples are entirely alike, and the above description applies to a form in which all the normal markings are well defined. In the actual course of the lines there is little real variation; but in the amount of contrast between the spaces there is much. The basal and terminal spaces may be bluish-powdered; the outer half of the median space may be contrastingly dark, or it may be scarcely shaded; the whitish shade beyond reniform may be scarcely noticeable, or it may extend to the costa and form a large quadrate blotch. As a general thing the males are the smaller, although the largest males exceed the smaller females.

I suspected when I first received this large lot of specimens that it might be one of the Central American species, and sent examples to Sir George F. Hampson for comparison. He assures me that the species is not represented in the British Museum collections, and as it fits no description known to me I assume that it is new.

Campometra paresa, n. sp.—Head and collar deep, almost blackish-brown. Disc of thorax, including patagia, whitish, more or less powdered with brown scales. Abdomen deep brown, incisures narrowly black-ringed. Primaries with a broad whitish costal area, starting from the entire width of the wing at base, narrowing gradually to before the s. t. line, where it is abruptly terminated; terminal space beyond s. t. line also whitish, interrupted by a dusky cloud at about its middle. The intervening triangle is deep, blackish-brown. The costal pale space may be without obvious marks except costal dots at inception of usual lines, or it may be crossed more or less obviously by the basal line, which is narrow and inwardly oblique; by the t. a line, which is broken, dislocated and fasciform; by the median line, which is narrow and linear; and by the t. p. line, which is black and outwardly oblique. An extension of the median dark triangle reaches the apex and dilutes the pale terminal space at that point. S. t. line pale, outwardly shaded by reddish, irregular and a little sinuate in course. The reniform is pale, narrow, ovate, and breaks into the dark triangle from the costal area. There is a rivulous black terminal line following the scallops of the wing margin. Secondaries blackish-brown from base to s. t. line, the latter a little sinuate, pale, followed by a reddish shading, the space beyond whitish, with brown powderings; a blackish or brownish cloud breaks the pale area in some examples. Beneath, dull smoky-brown, with a dusky discal spot and obscure transverse lines at and within the middle on all wings.

Expands: 1.24–1.48 inches = 31–37 mm.

Habitat.—Yavapai Co., Arizona, May 23–31. Hutson. So. Arizona, Poling.

Six males and four females in fair to good condition. Although this species looks like *selenis*, it is really so close to *protea* that I was at first inclined to believe it only an extreme variety. The maculation, so far as it is traceable, is almost identical, and the description of the former will answer very nearly for the present species. But though I had so many examples, I could not get any real intermediate forms to this type with whitish costal and terminal area, and as this was also uniformly darker on head, thorax and abdomen, I concluded to risk description.

Homopyralis edilis, n. sp.—Ground colour a reddish luteous, overlaid and powdered by brown and black scales forming the ornamentation. Head, collar and palpi deep chocolate-brown ; thoracic disc more powdery. Abdomen of the ground colour, the segments obscurely dusky-ringed. Primaries with outer half of basal space shaded with dusky to the t. a. line, which is single, black, irregular, upright, and preceded and followed by a bar of the ground colour. At the edge of this bar in the cell is the black, punctiform obicular, and beyond it and to the black, oblique oblong reniform, a brown shade fills the cell and extends across the wing, forming the most obvious feature. The outer edge of this dark median fascia is at about the middle of the wing, and beyond it the pale ground extends to the dusky terminal space, broken on the costa by a deep brown blotch, which fills the s. t. space at that point. T. p. line slender, black, single, irregular, tending to become lost. S. t. line indicated only by the dusky shading, except at costa, where it is defined by the dark blotch. A series of black terminal lunules, each followed by a yellow edging which does not cross the fringes. The secondaries have the maculation of the primaries continued across the disk, and an oblong black discal spot. Beneath, pale yellowish, powdery, with obscure smoky median lines and a discal spot on each wing.

Expands : .74–.82 inches = 18.5–20.5 mm.

Habitat.—Yavapai Co., Arizona, June 23, 27, Aug. 2, 3, 8, 24. Mr. Hutson.

Five males and one female in fair to good condition. The August captures are labelled Minnehaha. In a general way the species resembles the eastern *tactus*, but is smaller, slighter and with a broader median band, in which the reniform is neither as large nor as conspicuous.

Mr. Hutson's collections in this genus included also a specimen of *H. cinctus*, described from Prof. Snow's material, and in the allied genus *Yrias* a large series of *Y. clientis*, *Y. repentis* and *Y. volucris*, as well as smaller numbers of *Y. irentis* and *Y. albiciliatus*.

Renia Hutsoni, n. sp.—Head, thorax and primaries fawn-gray, tending to reddish ; the males darker, with smoky powderings. Head and thorax immaculate. Primaries, t. a. line upright or a little oblique, smoky, with a preceding yellowish line, tending to become broken and diffuse in the male. T. p. line smoky, almost parallel with outer margin, even, followed by a yellowish line. S. t. line yellowish, a little irregular, preceded by a variable, often broken dusky shading, reaching the inner

margin very close to the t. p. line. There is an almost upright diffuse median shade through the middle of the median space. Orbicular a small, round, yellowish dot, scarcely traceable in the female, more obvious in the male. Reniform narrow, upright, yellowish, with or without a black dot inferiorly. Secondaries dull, smoky. Beneath, powdery, primaries with one, secondaries with two more or less imperfect transverse lines, all wings with a discal lunule.

Expands: .95–1.05 inches = 24–26 mm.

Habitat.—Arizona, Minnehaha, Yavapai Co., Aug. 18 to 21. Mr. Hutson. Southern Arizona, Aug. 1–15. Poling.

Seven males and four females, all in at least fair condition, and all save one taken by Mr. Hutson. The species is an ally of *flavipunctalis* and *pulverosalis* by its even median lines, but differs obviously in size, in the obscure maculation and in general habitus. The males are uniformly darker, more powdery and narrower-winged than the females, and, as a rule, the secondaries are immaculate. In one specimen an extra-median pale line is fairly defined, and in two others it is indicated toward the inner margin.

BARON C. R. VON OSTEN SACKEN.

It is with deep regret that we record the death of our greatly-esteemed friend, Baron Osten Sacken, the eminent Dipterist, who died at Heidelberg, Germany, on May 20th, in the seventy-eighth year of his age. He was born at St. Petersburg on the 21st of August, 1828, and for many years was attached to the Russian Embassy in Washington, and afterwards was Consul-General for Russia in New York. During the twenty one years he spent in America he prepared and published his own works on Diptera, and those of Dr. H. Loew, who was unable to write in English. To him is entirely due the first scientific knowledge of the North American species belonging to this great order of insects. A little over two years ago he published the "Record of his life-work in Entomology," a review of which will be found in the CAN. ENT. for December, 1903, Vol. XXXV, p. 344, and to which we would refer the reader who wishes for further information respecting the career of this remarkable man. He was an honorary member of the Entomological Society of Ontario. Only a few months ago the writer had a cheery, interesting letter from him; he was then in excellent health and spirits, though so near to fourscore years of age.

C. J. S. B.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 15.

Mites Affecting Farm Homesteads.

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Of late years there has been a considerable demand for information relating to insects which are found in houses, and which either annoy the occupants by their direct attacks or are injurious to household goods and provisions. It is therefore hoped that the contents of this article will be found of interest and practical benefit to those who have experienced the ravages of these minute insects.

It was upon the urgent request of Mrs. R. Eby, whose house was infested with mites, and situated at Alma, in Wellington County, about 20 miles from Guelph, that I decided to go down and make a personal investigation, and, if I deemed it necessary, to fumigate the house. When I arrived I found the conditions of the house to be exactly those that harbour mites. The house was poorly lighted, and left in a semi-dark condition, owing to blinds being drawn to exclude flies. The interior finish of the house was rough and poor, the wardrobes being made of unfinished rough lumber, and therefore admirable hiding places were afforded the mites by the numerous crevices and dark corners. The walls were badly cracked, and the partitions of the house were poorly fitted together, exposing loose joints and holes. The walls were covered with dark paper.

After having made a thorough examination of the house and its internal conditions, I proceeded to ask Mrs. Eby for information regarding the outbreak, and when the presence of the mites had been first observed.

It would appear that about two years ago the cellar was overrun with mites, but these were most likely of different species to those affecting the house at this time. The cellar had been thoroughly whitewashed, using a spray pump, and an effectual extermination resulted. Since that time no more mites had been seen in the cellar.

Next, mites were found in the barn on hay, and the inhabitants of the house then thought that they had been introduced by being carried in on the clothing of the men. This, however, did not account for the present outbreak in the house, as these also were of different species.

Food Habits and Life-history.

It might be as well, before entering further into a discussion of what methods were adopted for the eradication of the mites, to briefly discuss the life-history and a few characteristics of the species found.

The mite was identified as *Tyroglyphus longior*, and is a very minute, colourless, eight-legged creature, which is usually found swarming in numbers over and in old cheese and various stored products, such as dried meats, dried fruits, vanilla, and flour of different kinds. It is rapid in its movements, has a cylindrical body, and has numerous shining hairs sticking out on the sides. The species is common to Europe and the United States.

All through the summer months, and in warm houses during the winter months, these creatures breed with astonishing rapidity and fecundity. The rapidity of multiplication, and the extraordinary numbers in which these mites will occur under favourable conditions, are almost incredible. The females bring forth their young alive, and these in turn rapidly reach full growth and reproduce. Through the summer months the mites are soft-bodied, and have comparatively feeble powers of locomotion, but it has been ascertained that when necessity requires it, and when the insects happen to be in the proper stage of growth, they have the power of not only almost indefinitely prolonging existence, but of undergoing a complete change of form, acquiring hard, brown, protective covering, into which all of the legs can be drawn in repose. It has been proved by Van Leeuwenhock, who was an eminent Dutch naturalist, that the softer form can undergo a fast of eleven weeks without apparent discomfort, and it is now known that in the hard shell, or Hypopus state, it may remain for many months without food.

Strange as it may seem, the mites affecting this particular farm homestead were found almost exclusively living in cracks and crevices, and around and on old clothing and rags of all descriptions. Very few indeed were found infesting the pantry or attacking cheese or any other household provisions. This apparent attraction for old clothing was soon observed by the women of the house, and they at once adopted a plan for trapping them. Numerous old rags were gathered together, and scattered around the house in all directions. The next morning they were all gathered together and carefully shaken over a table, and all the mites that fell off were then killed at once by hand. On all the traps not more than from one to two dozen mites were found per day.

The presence of the mites in the house, and their habit of congregating on the clothing, caused a great deal of more or less imaginary discomfort to the ladies of the house, although the species is one that is

not parasitic. Between dread of the mites and excess of work in trying to exterminate them, Mrs. Eby was reduced to a state bordering on nervous prostration, brought on by undue excitement and a false notion that the mites were there to stay for good, no matter what means be adopted to effect a remedy.

Method of Treatment.

After securely shutting the windows and doors of the house, I fumigated thoroughly with Hydrocyanic acid gas, using 24 ozs. to 1000 cubic feet. This strength was used in order to insure that the gas might enter the partitions and circulate around the wood thoroughly. The unfavourable internal condition of the house made it difficult to estimate the exact strength required to kill all the mites. After the fumigation all the rag traps that had been left around were subjected to a careful and thorough examination, and all the mites present were found to be dead, except one sole survivor, that was taken from a trap placed in one of the wardrobes. This being so, nothing would satisfy the exacting demands of the occupants but another immediate and stronger fumigation. This was at once carried out, 32 ozs. to 1000 cubic feet space being used. This appeared to prove quite affective, and no more living mites were to be found.

Before the fumigation, the Ebys tried burning sulphur for 24 hours at a time, and found this treatment to be of no avail, the mites being quite as abundant after the treatment. Turpentine and Carbon bisulphide had also been tried, but with little or no effect.

In conclusion, instructions were left to carry out the following plan of procedure : Close all the openings in the walls, and repaper the house with light-coloured paper. The wardrobes to be made of planed and finished lumber, and papered. To fumigate with Hydrocyanic acid gas, 24 ozs. to 1000 cubic feet space if the mites should reappear. Nothing, in fact, but the utmost cleanliness and watchfulness will prevent the appearance of the mites. All energies must be bent towards prevention. Food supplies and old clothing liable to be infested should be inspected daily during hot weather.

A report has recently been received from Mrs. Eby, stating that a few mites are yet living. This point goes to prove their extreme tenacity of life, and it is altogether likely that in every such house kept dark, and fitted with unfinished rough lumber, mites will be found.

LIFE HISTORIES OF NORTH AMERICAN WATER-BUGS.

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II.

Life-History of *Ranatra quadridentata*, Stal.

Of the water-bugs, perhaps *Ranatra* and *Nepa* are better known than the others in their anatomy and earlier stages. Dufour's classic on the anatomy of *Nepa cinerea*, L., and *Ranatra linearis*, L., has been followed by the work of other investigators in these two species, and the peculiar filamentous ova of the two genera have long been favourites with students. But nevertheless, thus far no complete life-history has been worked out for either of them. In the following pages are presented the results of my preliminary breedings of *Ranatra quadridentata*, Stal.

The remarkable eggs of *Ranatra* have received much attention from European entomologists, and the use of the two filaments adorning them has been the subject of much speculation. They are deposited in the early spring in the decaying stems of rushes, and in the course of three weeks or so the little bugs emerge. They very much resemble the adult, except that they are, of course, much smaller. After five moults, they reach maturity in some eight weeks or so. It is possible that there may be two broods from ova deposited early in May, but there are no data bearing on this point, although I have taken young nymphs as late as September. In copulation, the male is below and to one side of the female. The adult female is furnished with a pointed, keeled, toothed ovipositor, and can be readily distinguished from the male, in which the ventral portion of the genital segment corresponding to the ovipositor is not keeled, is flatter, and more rounded at the extremity.[1]

Ranatra quadridentata frequents deep waters, where it clings quite fast to the stems of rushes or grasses, with its air-tube or siphon piercing the surface film. At times it swims about, while at others it simply floats head down, with the tip of its air-tube at the surface. It will also float parallel to the surface of the water, at a greater or less distance from it, and in such cases the air-tube makes an angle with the body, varying in sharpness according to the depth at which the bug lies. One *Ranatra* was taken perched on a lily-pad, the tip of the siphon touching its surface, and the legs straight and inclined backwards. This is much the position it assumes on taking flight. After balancing itself a moment in this posture, the bug crouches far back, with its legs much bent, and then suddenly leaps into the air with a loud whirring noise made by its wings.

1. Cf. Uhler in Standard Natural History, Vol. II, p. 255.

The prothorax is much bent forward, and the anterior legs are bent back over it just before the insect takes flight. The European *R. linearis* is recorded as flying by night.[2]

Ranatra swims slowly, with an alternating motion of the second and third pair of legs.[3] Uhler states[4] that *R. fusca* may be seen resting at the bottom, stilted on its long hind legs. I have not seen this myself. It also creeps among the grasses.

The food of *Ranatra*, I have found, consists of those unwary insects that fall into the water. These it seizes in its raptorial anterior legs and draws slowly to its beak, which moves and twists about, touching the prey until a suitable place is found to penetrate with its lancets.[5]

The *Ranatra linearis* (of which the greater part of the literature treats) is said to feed on the larva of *Ephemeræ*.[6]

Ranatra hibernates as an adult, and is sometimes found frozen in the ice of ponds. It seeks some sheltered place under an overhanging bank, or delves into the mud,[7] and there it lies torpid till the spring comes, when it can be found all muddy and grown over with green algæ. I have taken it sluggish in early November from a hole under the bank of a pond. As in most water-bugs it is parasitized by a species of *Hydrachna*. Its stridulation has previously been noted, and is a peculiar faculty. The coxal plate rasps can be seen in the earliest stages of the nymph.[8]

The peculiarities of the respiratory system of *Nepa* and *Ranatra* have been the subject of a number of important studies. The chief of these are, of course, Léon Dufour's "Récherches anatomiques sur la *Ranatra linearis* et *Nepa cinerea*,"[9] and his masterly "Récherches anatomiques et physiologiques sur les Hémipteres." These two works,

2. Amyot & Serville, Histoire Naturelle des Insectes, Hémipteres, p. 443.

3. Bueno, Entomological News, Vol. XVII, p. 3. Also noted by Westwood, Introduction, Vol. II, p. 462 ; and Schiödte, Ann. & Mag. N. H.? (4), Vol. VI, p. 236.

4. Standard Natural History, Vol. II, p. 254.

5. Bueno, CANADIAN ENTOMOLOGIST, Vol. XXXV, p. 236.

6. Westwood, op. c., p. 461.

7. Marshall and Severin, "Some points in the anatomy of *Ranatra fusca*, P. Beauv.," Tr. Wisc. Acad. Sci., Arts & Letters, Vol. XIV, pp. 487–508, Pls. XXXIV–XXXVI. (See p. 487.)

8. CANADIAN ENTOMOLOGIST, Vol. XXXV, pp. 235–7, and Vol. XXXVII, pp. 85–7.

9. Ann. Génér. sc. phys. (Brussels), Vol. VII, pp. 194–213 (1821).

although written in the early years of the last century, are to this day of the utmost importance in the study of the Hemiptera. Locy's work[10] follows in the footsteps of his predecessors, and gives nothing new on this point. In the paper by Schiodte on morphology and classification,[11] the subject is carefully treated. This will be referred to later, since his views have been borne out by my dissections. The only other paper on the subject known to me is that by Marshall and Severin, previously cited, and to be referred to later. In regard to the last paper, it may not be out of place here to mention two points, one being the form of the generic name, which is given as "*Ranantra*" (recte *Ranatra*), and the other that the figures, which have been drawn with the aid of the camara, as it is specifically stated, undoubtedly are of *Ranatra quadridentata*, Stal., and not *R. fusca*, P. B.

The substance of Schiödte's remarks on the respiratory system of *Nepa* is that they have, in common with all other Heteroptera, ten pairs of spiracles, three thoracic and seven abdominal. In this view, consequently, the respiratory semi-tubes are the highly specialized appendages of the seventh abdominal segment. Attention is called to the three pair of large sieve-like false spiracles of the abdomen, to which further reference will be made, and to the very small, nearly obliterated, true spiracles.

In accordance with the results of previous investigators, the main trunk tracheæ have their origin in the large spiracles situated a short distance above the insertion of the two halves of the air-tube, in the halves themselves. Thence they go up through the bug's body to the head, giving off branches, many capillary, which go in to aerate the organs, and also the nine main branches to the spiracles.

Agreeing with Schiödte (op. c.), I have found ten pairs of spiracles. It is to be noted that some authors consider the siphon or air-tube the lengthened peritreme of the seventh spiracle, a view that would seem to be reasonable. It is also worthy of notice that there apparently is no device for closing this spiracle, which appears merely as a round opening, as if the tubular trachea had been cut off straight across. The sixth pair of spiracles is situated in the lateral pieces of the subdivided sixth abdominal segment. The next three pair are placed in the peritreme of

10. "Anatomy and Physiology of the Family Nepidæ," Am. Nat., Vol. XVIII, 1884.

11. On some new Fundamental Principles in the Morphology and Classification of the Rhynchota, Ann. Mag. N. H.? ser. 4, Vol. VI, pp. 225–249.

the false stigmata. The two remaining pair are situated, that of the second segment on the longitudinal lateral abdominal seam, and that of the first near the prothorax. All but the first pair of these spiracles, although connected with the stem-tracheæ by branches, appear to be rudimentary and nonfunctional, being merely an irregular slit in the integument. The second pair can be recognized from the inside only, by the tracheal connection, but there is no apparent opening. The so-called stigmata of the third, fourth and fifth abdominal segments *have no apparent connection with the tracheal system.* I have demonstrated this in several dissections by isolating the respiratory system *in situ*, and following the branch tracheæ to their termination in the body-wall. These branches lead to the thickened wide border surrounding the sieve-like portion of the false stigmata, which broadens on the inner side to accommodate the true slit-like rudimentary spiracle, to which the trachea can clearly be seen attached. The late Joanny Martin[12] has followed the development of these in the nymphal *Nepa*, and finds that they are formed independently of the true functional stigmata of the nymph, which at the last moult are narrowly obliterated. What the present function of these peculiar structures may be is rather obscure, although it is possible that they may be useful in aerating the body fluids by extracting oxygen from the water by osmosis The structure of these stigmata in *Nepa* is well shown in Dufour's work cited on the anatomy of the Hemiptera, figs. 194 to 200.

Returning to the respiratory system, we find on the upper side of the metathorax, under the wings, a large functional spiracle, which connects by an ample trachea with the main system. This Schiödte calls the "spiracula metathoracica." Further along we come to his "spiracula mesothoracica," the second thoracic, which is smaller, and lies in the seam between the meta- and mesothorax, concealed by the mesothoracic epimera. The first pair of thoracic spiracles, which no other author appears to have recognized, are situate at the cephalic margin of the mesothorax, in the membrane connecting it with the prothorax, and covered by the latter. This pair is Schiödte's "spiracula prothoracica." They are the largest spiracles in the insect, and are peculiar because of their oblong rectangular shape, with rounded corners, and because they open not at the end of a trachea, but in the wall of a large tube, which is here parallel to the mesothoracic cephalic margin. The function of this spiracle is

12. "Origine et formation des faux stigmates chez les Nepidæ (Hémiptères)." Bull. Mus. de Hist. Nat., Paris, No. 3, pp. 1–2 (1895).

possibly to fill the large air-chambers that are found in the thorax of *Ranatra*, when the head is bent forward at the moment of taking flight, as previously described.

The respiration of the adult while in the water is evidently through the air-tube or siphon. This may also be used when out of the water, but the main reliance is probably in the thoracic spiracles in the latter case. The great disparity in size of the latter as compared to the former is in all likelihood due to the violent exertions *Ranatra* makes while in the air in flight, these, so far as known, being the only occasions on which it leaves its natural element. Of course, while in its customary surroundings, its sluggish habits make deep breathing unnecessary, and, as suggested before, the so called false stigmata may be functional in some way when the bug is submerged.

The air-tube, as Marshall and Severin point out,[13] may be cut off short without causing the insect any apparent inconvenience. This, of course, has further proof in the varying lengths of the tube in different individuals of the same species, in different species, and in different genera. What is more remarkable, is that a difference in length between the two halves of the tube seems not to affect its usefulness. Among my captures was a *Ranatra* in which one-half of the siphon was broken off within an eighth of an inch from the body, and which lived for some months in my aquarium. When entering the water after being out of it for any length of time, the two halves of the air-tube are moved alternately in and out. Sometimes the silvery column of air can be seen *rising* in it little by little, from the abdomen, till at length it reaches the distal end of the siphon. Miall[14] claims that in *R. linearis* the continuity of the tube "is maintained by a multitude of hook like bristles, which project from the opposed edges." This is not the case in *Ranatra quadridentata*, in which these fringing hairs are simple. Indeed, the fact that the bug can separate the halves at will as well as move them independently of each other, would seem to militate against this view. Further, the natural formation of a surface film where water is in contact with air in limited areas, would render such a device unnecessary.

In the nymph the respiratory system is very different from that of the adult. The principle, of course, is the same in both, since both breathe atmospheric air which they get by piercing the surface film by means of a

13. Op. c., p. 494.
14. Natural History of Aquatic Insects, p. 353.

device at the end of the abdomen that conveys the air to its destination. Here, however, the similarity ceases. While in the adult the siphon is as previously described, in the nymph this bisectional tube is replaced by an involution of what may be the seventh abdominal segment, which is rolled up and has an open joint beneath, the edges being fringed with hairs. The sides of the abdomen are folded under, covering the inferior part of the abdomen on each side to within a third of the distance to the keel, which is fringed with hairs, as are the bent-under abdominal edges. These bent-under edges are continuous with the rolled siphon. Under these edges, in the channel thus formed for the passage of air, lie the functional abdominal spiracles. The false stigmata appear as dark thickenings of the dorsal integument, but show no opening or internal connection in the nymph as pointed out by Martin (op. c.). The edges of the folded-over connexivum are indented under the darkened areas. The abdominal spiracles are plain circular openings, to which the tracheæ run. They present no peculiar features. Owing to lack of material, and partly to the great difficulty in dissecting nymphs satisfactorily when in the fifth instar on account of the formative processes then so actively at work, it has not been possible to demonstrate the thoracic spiracles. This is reserved for another occasion.

The detailed life-history which follows is lacking in many particulars, but this was in a great measure unavoidable, as my material in some of the instars consisted only of the cast larval skins. These are in many ways very good for showing details of structure, but owing to their extreme thinness it is at times impossible to mount them satisfactorily.

Ovum.—Shape: Imperfectly oval, flattened at the upper end, from which arise two long thread-like processes, longer than the ovum and thickened at the base, diminishing in thickness toward the apex.

Size: Long., 3 mm.; lat., 1 mm.; appendages, long., 5 mm.

Colour: White at the base, growing dark toward the apex; when freshly deposited clear white.

Markings: Surface of chorion thickly covered with irregularly circular pits, in the middle of which is a point. The processes appear smooth.

The egg of *Ranatra*, together with that of *Nepa*, has long been a favourite subject for study, owing to the alluring peculiarities of structure. Entomological works invariably refer to its bifilamented condition, especially to that of *R. linearis*, L., on which all the studies and experiments to date have been made. Shuckard, in his translation of

Burmeister, figures the ovum of the latter insect *in situ*, but his cut gives an erroneous idea of how they are deposited. Howard[15] briefly refers to the manner in which they are placed, and mentions the nature of the filaments. Sharp[16] quotes Korscheldt to the effect that the filaments are pneumatic in function, although he doubts it. Burmeister[17] mentions the filaments and the manner of oviposition, and Packard also refers to this peculiarity.[18] The method of oviposition is also mentioned by Westwood, who quotes Rösel and Geoffroy, the former to the effect that the eggs are dropped at random, and the latter as stating that they are inserted in the stems of aquatic plants, leaving the filaments only exposed.[19] In addition to these two, Amyot and Serville[20] quote De Geer as to the form and filaments of the ova. The best account of the ova, with a sufficiently accurate figure, is that of Pettit.[21] This has the honour of being the first description of the ova of any American *Ranatra*, although the species is quite doubtful, owing to the obscurity in regard to the number of our native forms.

Ranatra quadridentata endeavours wherever possible to insert its eggs in some soft substance, either a growing plant or a decaying one. If these be not available, the ova are dropped loosely, although this is the last resort of the over-distended gravid female. The bug is provided with a sharp toothed ovipositor, which it digs into the plant stems, thereby making a hole for the reception of each egg. The ova of *Ranatra* also increase in size as embryonal development progresses. They reach maturity in about two or three weeks, the queer little bugs emerging through a round cap at the top which carries the filaments. On emerging they are greenish yellow, and so very soft that they bend double when picked out of the water. Later, in the course of a few hours, they attain the darker colour mentioned in the description.

15. Insect Book, p. 277.
16. Cambridge Natural History, Insects, Vol. II, p. 564.
17. Handbuch, Vol. II, p. 199.
18. Text Book of Entomology, p. 523.
19. Introduction, Vol. II, p. 461.
20. Histoire Naturelle des Insectes—Hémiptères, pp. 442–3.
21. The Egg of the Water Scorpion *(Ranatra fusca)*. CANADIAN ENTOMOLOGIST, 1902, Vol. XXXIV, pp. 212–13.

The three individuals bred emerged, one in fifteen days (the only one that eventually reached maturity), and the other two, from ova deposited in my aquaria, in twenty days. Some others were varying periods in the embryonic stage, but these were not closely observed, although in general the period was about three weeks or less.

First Nymphal Instar.

Form in a general way resembles the adult. It is, however, broader in proportion to length. The head, including the eyes, is broader than long, excluding the rostrum. Each eye is less than one-third the width of the head, round and projecting beyond the thoracic margins. The thorax is a little under one-third the total length of the bug. It shows the three rings.

The rostrum is four-jointed, stout, the first joint stoutest, about twice as long as the second, and subequal to the third and fourth. The fourth or terminal joint is furnished with tactile hairs, as in the adult, the antennæ are short, club-shaped, one-jointed, the extremity nearly as broad as the length, situate near the basal joint of the rostrum. The thorax is a little under one-third the total length of the bug, and shows the three rings. The bifid air-tube is absent, its place being taken by the blunt extension of the terminal abdominal segment, as described in connection with the respiratory system. The legs are comparatively stout, the second and third pairs being nearly as long as the entire bug. The tarsi of the first pair are one-jointed and entirely destitute of claws; those of the second and third pair are also one-jointed, armed with long claws. The tibiæ of these two pairs are armed with a comb-like row of stout spines going partly around at the distal end, at the tarsal joint, and are furnished with a few coarse hairs at this end also. The first pair of pedes is the counterpart of those of the adult, except that they are much broader in proportion, and do not show the blunt, so-called apical tooth in the femur.

Size: Long., 8 mm.; lat., 1 mm. at thorax; air-tube, long., 1.5 mm.

Colour: Brownish of varying shades, including the legs, which are banded with lighter rings. The eyes are black or dark brown.

Markings: None sufficiently definite to be called such. There is a lighter median line in the thorax.

The nymph that finally reached the adult came to the first moult in fourteen days, the other two in eight days. The latter were from bred ova, and the transformation took place in July.

Second Nymphal Instar.

Form as in the first stage, perhaps a little less broad in proportion to the length. Rostrum as before, except that it is perhaps a little less stout. Antennæ still blunt, short and stout, but not so club-shaped. They now begin to show two equal joints. The legs as before, the first pair not quite so broad proportionally, with the blunt apical femoral tooth beginning to show as an undulation in the inner side of the femur. The tibiæ of the second and third pair are better provided with spines, which increase in number distally. The terminal combs very apparent.

Size: Long., 13 mm,; lat. not measured, dimensions being taken from moulted skins.

Air-tube, 2.7 mm.

The survivor came to the second moult in nine days, the other two in six. These died on the 21st, due to their being carried about in water.

Third Nymphal Instar.

Form, not greatly changed from the preceding instars, except for slight variations in proportions.

Rostrum, much as before, but a little slimmer. In this instar the tactile hairs at the extremity of the proboscis are quite noticeable.

Antennæ appear imperfectly three-jointed in this instar. The suture separating the basal joint is quite noticeable, and that between the second and third joints shows as an incision in the outer margin of the antennæ, from which a little impressed line goes about half way across. Below and above this indentation are two prominences, the beginning of the lobes of the segments. Both prominences are armed with a stout spine, that of the third joint being about twice as thick as that of the second. The third joint appears to be pitted at the rounded end.

Thorax much narrower, distinctly trisegmentate. Head closer to the adult shape, the eyes flattened on the inner side, and quite prominent. The wing-pads first appear in this instar, though very small and rudimentary.

Legs and tarsi as before, with the spines of the second and third pair of tibiæ stronger, and the tibial comb more developed. In this instar the fringing hairs of the second and third pair appear, scattered on the femora and sparse on the tibiæ, but quite long.

The false stigmata are quite noticeable at the sides of the abdomen, as darkened spots in the integument. The legs are now shorter than the

length of the bug, and reach but little beyond the extremity of the respiratory tube. The first pair are not quite as broad proportionally as in the previous instars, and show the same undulations of the femora where the second tooth will be.

Size : Long. (extremity of the rostrum to end of siphon), 19 mm.; lat., 1.4 mm.; air-tube, long., 4 mm.

My one nymph came to the third moult in seven days.

Fourth Nymphal Instar.

Form as before. Rostrum but slightly changed.

Antennæ evidently three-jointed, the prominences more developed, and the several spines on the third and second segments quite evident.

Legs and tarsi as before, with the peculiarities more accentuated. They extend only a little beyond the siphon, and are therefore not as long as the body by the length of the thorax.

Colour more or less mottled, with banded legs. General tint grayish.

Size : Long., 30 mm.; lat. (not taken, specimen being only a cast skin in this instar); air-tube, long., 7 mm.

The specimen attained the fourth moult in eight days. The shortness of the nymphal instars in the hot days of July is worthy of notice.

Fifth Nymphal Instar.

Form elongate as in the adult. Head, including eyes and exclusive of rostrum, broader than long. Rostrum as before, but nearer the adult shape. The second joint begins to show the basal constriction so notable in the adult.

The rostrum is shorter than the length of the head. Eyes transversely elongate, somewhat flattened on the inner margin, projecting beyond the expanded anterior portion of the prothorax. Antennæ are still two-jointed, the basal joint extending into a process, nearly as stout as the terminal joint, and about three-fifths as long. The suture between the joints is very faint. The joints are now abundantly furnished with the tactile spines, which reach full development in the adult. Prothorax widened anteriorly by the sockets of the anterior pedes, gradually constricted towards middle, and expanding again basally, but not quite as broad as the anterior portion ; excavate anteriorly for the insertion of the head and truncate posteriorly. Prosternum not sulcate, deeply excavate posteriorly. Mesothorax with long narrow wing-pads of the hemelytra, pointed posteriorly in the middle. Metathorax concealed. First abdominal segment showing as a ring between the wing-pads of the

posterior alæ, which barely attain the extremity of the pads of the hemelytra. A straight suture marks off this segment from the next. The abdomen is more than twice the length of the thorax, the segment following the thorax slightly constricted. The sides of the abdomen are folded over itself, and are furnished with fringing hairs. There is an indentation in the edge at each segment that bears the thickening of the formative pseudostigmata. The abdomen has only six apparent segments and the siphon or air-tube. The false stigmata show in segments three to five, dorsally, as thickenings of the integument, darker than the surrounding skin. The siphon is jointed to the sixth segment, and freely movable. The abdomen is keeled beneath, the keel bearing a fringe of short hairs on each side, which meet those of the inflexed abdominal margin. The legs approach more closely to the adult. The second so-called tooth or prominence in the first pair is quite evident. The true tooth is large and triangular, and the clawless tarsus rests against it when the tibia is folded on the femur. The second and third pair are slender, ciliate, with globose coxæ ; the tarsus of the second pair does not quite reach and the second goes slightly beyond the end of the siphon. Both these tarsi are one-jointed, and armed with prominent curved double claws.

Size : Long., 44.4 mm. (from tip of rostrum to tip of siphon); lat., 2.9 mm. (at the thorax, but *not* at wing-pads). Siphon., long., 12.3 mm.

Colour : More or less luteous of varying degrees, without any special pattern. The legs, which in the preceding instars are banded, are apparently unicolorous in this. This, however, may be the peculiarity of the two individuals from which this description has been drawn up. The eyes are black and shining.

This individual arrived at the adult in eight days.

The periods for each instar are as follows, for the individuals bred to maturity or to the third instar :

Ova taken, May 20, 1905.		Ova deposited, June 6, 1905.	
Emergence, June 4,	"		July 4, "
First moult, " 18,	"		" 12, "
Second " " 27,	"		" 18, "
Third " July 4,	"	Died	" 21, "
Fourth " " 12,	"		
Fifth " " 20,	"		

This gives 61 days from the ovum to the adult, or perhaps seventy days, if we allow for the time that may have elapsed before the ova were collected. The full number of instars is seven, as follows: one embryonal, five nymphal, and one perfect adult.

Mailed July 7th, 1906.

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PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALBERTA.

(Continued from page 94.)

488. *Hydriomena quinquefasciata*, Pack.—Very common. Middle July to middle Aug. Exceedingly variable. The specimens that I have from the mountains (Banff) are duller in colour than those taken nearer Calgary, with less green. Mr. Taylor says: "It is best for the present to use the name *quinquefasciata*, Pack., for the moth we have been calling *sordidata*. It is probably the same as the *sordidata*, Fabr., of Europe (but a good variety), but it is not the *sordidata* of Packard's Monograph, which I think must bear Packard's name, *nubilifasciata*."

489. *H. ruberata*, Freyer.—Mr. Taylor says: "This species, which stands in most of the collections as *trifasciata*, is, I think, really *ruberata*, Freyer, of which I have English specimens. The *trifasciata* of Packard was not the *trifasciata* of Borkhausen, which = *autumnalis*, Ström." My records up till 1905 were June and early July, and I never saw it at all common. But during the present season (1906) the males have come rather freely to outdoor light between May 10th and 14th.

489a. [*H. autumnalis*, Ström.—Of a specimen taken by Mr. Hudson at Springbank, near here, on May 30th, 1905, Mr. Taylor said: "More like European *autumnalis* than most others I have seen." The specimen was much more strigate and less obviously banded than any *ruberata* I had previously seen, and certainly suggested another species. But after comparing it with some of the more recent captures of *ruberata* above mentioned, I am doubtful of its distinctness therefrom. I have compared this specimen with the species in Mr. Cockle's collection at Kaslo, recorded as *autumnalis* in the Kootenai list, and believe it to be entirely distinct.]

490. *H. multiferata*, Walk.—Two specimens near Billings's mill, July 3–7, 1895, and June 19th, 1898.

491. *H. custodiata*, Gn.—A male at light on Pine Creek on July 18th, 1903, and a female flying in the daytime by the Red Deer River, north-east of Gleichen, on July 4th, 1905. Mr. Taylor tells me that Dr.

Holland's figure under this name is really *H. excurvata*, of which I have specimens from Victoria, B. C. The species bear no resemblance to one another.

492. *Triphosa indubitata*, Grt.—A male on October 22nd, 1902. The name stands in Dr. Dyar's list as a synonym of *progressata*, Walk., which Mr. Taylor tells me is not North American.

493. *Cœnocalpe magnoliata*, Gn.—Two specimens only, one on July 30th, 1893, near mouth of Fish Creek; the other here in the hills at light, June 26th, 1903.

494. *C. polygrammata*, Hulst.—A badly rubbed male on July 3rd, taken by beating in daytime, and a fine female three days later, both on the Red Deer River, about 50 miles from Gleichen. The first record for the species in Canada, according to Mr. Taylor.

495. *C. topazata*, Strk.—Probably not rare in the spruce. I have only two specimens at present, June 5th and July 5th, "Billings's mill."

496. *Gypsochroa designata*, Hfn. One on July 2nd, 1893, near mouth of Fish Creek, and a male at light at the Red Deer River locality on July 4th, 1905. The localities suggest a prairie rather than a mountain species.

497. *Xanthorhoe incursata*, Hbn.—I have taken it somewhat sparingly amongst the spruce near Billings's mill, and in the mountains near the Lake Louise Chalet at Laggan, almost up to the limit of timber, the highest-up capture being at Mirror Lake, about 6,500 feet. End June and July. The species occurs in B. C., but is not common.

498. *X. abrasaria*, H. S.—A mountain species. I have it from Laggan, Banff (top ridge of Sulphur Mt., 8,000 feet), Lineham's lower log camp, and Billings's mill. The latter place is almost the eastern limit of the spruce, beyond which it does not seem to occur. Not rare. Middle July to middle Aug.

499. *X. munitata*, Hbn.—A common and very variable insect, in which the sexes might easily be mistaken for two species. The ground colour of the males is dull pearly gray, and there is a strong tendency for the central purplish band to become constricted in the submedian interspace. In one of my specimens the blackish defining lines actually touch. The females have as a rule the ground colour tinged with ochreous, and have a wider band. A female from Laggan, taken above timber (over 6,500 feet), on Slate Mt., differs so in the band from any of my Calgary specimens, that I felt sure it was a distinct species, but Mr.

Taylor has seen it, and refers it to this series. The band is very much redder, more uniform in colour, has not nearly such distinct reticulation, and is bordered by narrow dark lines instead of irregular shades. I took a closely similar female near the Chalet at Laggan, below 6,000 feet, on July 14th, 1904. The only other *munitata* which I have from the mountains is a typical male. Mr. Taylor says of a picked series I sent him: "I am calling it *munitata*, but our western *convallaria* is very like it. It is *not* our British Columbian and Californian *defensaria*." I am indebted to Mr. Taylor for Wellington specimens labelled *convallaria*, and though forgetting that he had sent me the above note, found myself unable to distinguish them from the Calgary species. *Defensaria*, which I have from both Wellington and Kaslo, differs, amongst other respects, in the less concave anterior edge of the band. In the Kootenai list, recording *convallaria*, Gn., as common in that district, Dr. Dyar says: "Hulst's *nemorella* from Alaska is scarcely more than a variety of this, and both will be found to unite with the European *munitata*, Hbn." End June to early Aug.

500. *X. ferrugata*, Clerck.—Common. Middle June to middle July.

501. *X. circumvallaria*, Taylor (CAN. ENT., XXXVIII., 205, June, 1906*.—Fairly common in the spruce near Billings's mill. My only dates are June 19th and 24th. I have not yet heard of it from any other locality. Easily distinguished from any other geometer occurring here by having a well-defined blackish outer border to the secondaries.

502. *X. fossaria*, Taylor, MSS.—About ten specimens at Agnes Lake, Laggan, 6 850 feet, just below the timber line, on July 20th, 1904. Wellington specimens (June 15th to 30th, in my collection) are much more clearly marked, and look to me like another species. Specimens in Mr. Taylor's collection from Stickeen River, in northern B. C., are, however, somewhat intermediate. Mt. Cheam specimens are exactly like those from Laggan.

503. *Synelys enucleata*, Guen.—Two specimens from the Red Deer River locality, taken by beating bushes in the daytime, on July 5th and 6th, 1905. Both in fine condition. One is exactly like Dr. Holland's figure under the name *alabastraria*. Of this specimen Mr. Taylor says: "It is *alabastraria* of the lists, but really a var. of *enucleata*, Gn. *Alabastraria* is European only." The other specimen, which Mr.

*"This is a form of the European *turbata*, Hbn." (L. B. Prout, in litt.)

Taylor labelled *enucleata*, entirely lacks the outer band, but has the inner and central lines more distinct. I was inclined to believe them two species.

504. *Cinglis ancellata*, Hulst.—Not common. End July and early Aug.

505. *C. sp. ?*—A male near Billings's mill on July 19th, 1905, is obviously distinct from anything else here listed, and I have taken one or two other specimens at any rate nearly related to it. Names have not yet been found for them.

506. *Leptomeris quinquelinearia*, Pack.—The males as a rule are taken fairly commonly at light and by beating, in July. It is common at head of Pine Creek, and on Red Deer River, and I have it from near Billings's mill, where I took one of the only two males I ever saw here. The other is from Lineham's log camp, in the foothills on Sheep Creek. The local series differs from specimens sent me by Mr. Taylor from Wellington, in being considerably smaller, having the lines as a rule less distinct, especially the fine black terminal one at base of fringes, which is often absent. A Cartwright (Man.) specimen agrees with the Calgary series. Mr. Taylor has not suggested a distinct species.

507. *L. sentinaria*, Hbn.—Common on the prairies, not common in the hills. Middle June and early July. It is probable that I have more than one species under the name.

508. *Eois persimilis*, Hulst.—A single specimen on July 25th, 1901, probably taken at light at head of Pine Creek. I sent the specimen to Mr. Taylor three years ago, retaining *L. 5-linearia* as a duplicate, an error which caused me endless confusion over the two names until I saw both species in Mr. Taylor's collection last March. Differences which he then pointed out to me are :—more even outer line (in *persimilis*), general indistinctness of lines, and almost rounded secondaries. I am not aware that I have taken another like it. The species was described from Quebec and Ontario. Hulst says in the description : "Sent by Mr. Hanham, of Winnipeg. The species seems to be midway in some respects between *E. inductata* and *E. 5-linearia*. Mr. Hanham writes me *inductata* is taken at Winnipeg in abundance on the open prairies, while this species he has only taken in dark woods." These remarks are probably not intended to imply that *persimilis* occurs near Winnipeg.

509. *E. inductata*.—Very common some years, frequenting the open prairies as well as the hills. A day flier, and comes freely to light.

Early July to middle Aug. A very variable species. I am not aware that I have taken more than one female.

510. *E. Hanhami*, Hulst.—Fairly common in the hills, but I have not so far met with it on the Red Deer prairies, where most of the other "waves" occur. Middle June to middle July. Described from Winnipeg. "Closely allied to *5-linearia* and *persimilis*, but with much more rounded wings, and the two outer lines different in direction." It is a whiter species than my *5-linearia*, and beneath it is far more smoky, lacking the conspicuous yellowish costa of that species. It also differs considerably in wing form. I have compared Kaslo specimens of the species recorded by Dr. Dyar in the Kootenai list as *rotundopennata*, Pack., for which I am indebted to Mr. Cockle, and am unable to distinguish them from this species.

511. *Annemoria bistriaria*, Pack.—A male at light at the Red Deer River locality, on July 5th, 1905.

512. *Eucrostis viridipennata*, Hulst.—Rather common some years. Middle May and June. Mouth of Fish Creek and head of Pine Creek. Fresh specimens are of a beautiful dark emerald, but it is the most fleeting green I know. It soon fades in life, and it is quite impossible to relax a good specimen without its turning to a dirty yellowish green or brownish yellow. If set fresh it keeps its colour fairly well. It was described from Colorado, but Hulst had a Calgary specimen from me, and called it *viridipennata* more than a year before the description was published. I obtained ova in 1905, and find a note that they hatched on June 2nd, and that the larva fed on *Salix*. They produced moths the following spring, but none were preserved. A day flier.

513. *Synchlora glaucaria*, Gn., = *aerata*, Fabr.—Not common. Head of Pine Creek, end June and July. I have not seen it elsewhere. Weather bleaches it from green to pale luteous, but the colour is not as fleeting as in the preceding species, nor does relaxing injure it. A specimen that Mr. Taylor has from me differs, he tells me, from all other described species of the genus in having a considerable portion of the usual green on secondaries replaced by white. None of my other specimens, however, show this variation.

514. *Aplodes Hudsonaria*, Taylor (CAN. ENT., XXXVIII., 206, June, 1906).—Seven males, at dusk and light, on the Red Deer River, north-east of Gleichen, whence the species was described, and named after Mr. Arthur F. Hudson, its first and principal

captor. The dates are July 5th and 6th, 1905, and some of the specimens are in very fine condition. Mr. Taylor, to whom I am indebted for a co-type, says that it differs obviously from its allies in that the cross lines on the secondaries disappear in the submedian interspace, instead of reaching the inner margin.

515. *Epelis truncataria*, Walk.—Not common. End May and June. A day flier. The species agrees with Dr. Holland's figure.

516. *E. Faxonii*, Minot.—A specimen in Mr. Taylor's collection, taken by Mr. C. Garrett on Fallen Timber Creek, about 20 miles west of Didsbury, on June 25th, 1904. Another specimen in my own collection, from the same locality, but dated May 28th, is probably the same species. The specimens have a much closer resemblance to *Dasyfidonia avuncularia* than to *E. truncataria* of Dr. Holland's figures. Mr. Taylor says: "*Faxonii* is not a synonym of *truncataria*. There is an error here in Dr. Dyar's list."

517. *Eufidonia notataria*, Walk. — Fairly common. } End May and June.

518. *Orthofidonia semiclarata*, Walk. — Common most years. } Both day fliers.

519. *Deilinia borealis*, Hulst.—Described from a pair from here. I have it from the mouth of Fish Creek westwards to Billings's mill. Not common. Middle June to early July. A day flier. No comment is made with the description, so I presume it had at the time no known close allies. But Mr. Taylor tells me that Hulst's *D. solamata*, described five years later from Manitoba, is nearly related to it, but is much darker.

520. *D. variolaria*, Gn.—Fairly common. July. The species is pure white, faintly peppered with gray or smoky, and has no transverse lines. In the latter respect it is quite unlike Dr. Holland's Pl. XLIII, fig. 36, which Mr. Taylor tells me is really *erythremaria*.

521. *D. erythremaria*, Gn. ?—Rather more common than the preceding. Mr. Taylor is in some doubt about the name. They are more gray powdered and less yellowish than typical specimens. A pair from Red Deer River have less powdering and yellowish lines, and may possibly be the true *erythremaria*. End June and July.

522. *Sciagraphia granitata*, Gn.—Common in the spruce, upon which, Dr. Dyar tells us, the larva feeds. A day flier. June and early July. A small male taken by Mr. C. Garrett on Fallen Timber Creek, about 20 miles west of Didsbury, on June 14th, 1904, has been placed in this series by Mr. Taylor, but looks to me distinct.

523. *S. denticulata*, Grt.—Common. June, July and Aug. It appeared this year on May 10th. A day flier. The ground colour is normally pale gray, but a purplish suffusion, in some specimens hardly apparent, in others obscures at least half the ground. The extremes might easily be taken for two species. One of my Red Deer River specimens, a female, has the ground obscured almost completely.

524. *S. continuata*, Walk.—Not common. Middle June to middle July. Dusk, light and treacle. It is possible that I may have two species under this name. In the more usual form the t. a. and t. p. lines are well defined, broad, and dark sooty brown or black. A less common variety has these lines very pale, narrow and faintly defined, most of my specimens of this form being females. I certainly have not every intergrade between the two, but in all other respects they appear to overlap. A male without the black lines was called *sinuata* by Hulst some years ago. Mr. Taylor has seen a series, including this specimen, but has failed to make any satisfactory separation. A female from Fallen Timber Creek, west of Didsbury, taken by Mr. C. Garrett on June 13th, 1904, has been referred as a small specimen of this species by Mr. Taylor. The maculation is not unlike that of some specimens in the series lacking the black lines, but I suspect it of being a different species. I have stronger beliefs in the distinctness of a short series from the Red Deer River, which I believe I can distinguish by their being grayer, having a smaller and less open discal spot, and a more distinct purplish band beyond the t. p. line. Mr. Taylor associates this with the Calgary form, which I have also from the same locality.

525. *S. mellistrigata*, Grt.—Two males from head of Pine Creek, July 24th, 1901, and Aug. 9th, 1902. Both at light.

526. *Philobia enotata*, Gn.—A male in perfect condition, July 4th, 1898; Billings's mill. Mr. Taylor has a male from me dated June 24th, 1899, but without definite locality. Probably not rare in the spruce.

527. *Diastictis (Cymatophora) sulphurea*, Pack.—Common everywhere. End July to middle Aug. in the Calgary district, but at the Red Deer River locality it is on the wing in early July. I rarely see a female. A day flier, and comes to light.

528. *D. flavicaria*, Pack.—Common. July and early Aug. Comes to light. I have a specimen of both this and the preceding named *flavicaria* by Hulst, but the two are easily separable as species. The usual form is pale lemon yellow, but a few specimens, with no real intergrades,

are of a dull washed-out smoky luteous, having but the faintest tinge of lemon, or sometimes none at all. One of these has been labelled *evagaria* by Hulst, but up to the time of writing Mr. Taylor had not seen this specimen. A Chicago specimen in Mr. Taylor's collection which he has identified with Hulst's *flavicaria* is not, however, very sharply distinct from some of the brownish or luteous specimens in the Calgary series. A specimen in his collection agreeing with Packard's figure and description of *occiduaria*, but having no data, looks like Calgary *flavicaria*, but is much brighter yellow. The plan of maculation is exactly the same in the two Calgary forms. I never saw a female of either.

529. *D. brunneata*, Thunb.—Not rare. Middle July to middle Aug.

530. *D. Hulstiaria*, Taylor, = *subalbaria*, Hulst, nec Pack. (CAN. ENT., XXXVIII, 112, April, 1906). A male from head of Pine Creek, taken on June 5th, 1897, is in Mr. Taylor's collection. I had had the specimen standing in my series of *Deilinia variolaria*, and, according to Mr. Taylor, Dr. Dyar fell into the same trap in recording this species as *variolaria* in the Kootenai list. I believe, however, that I saw both species in Mr. Cockle's collection. Hulst, in the description of *subalbaria* compares the species with *erythremaria*, not *variolaria*. *Virginalis*, Hulst, seems to be an extremely close ally.

531. *D. denticulodes*, Hulst.—Two male specimens at light, July 22nd and 25th, 1905, one in fine condition, but the first capture rubbed. Mr. Taylor says these are the first records for Canada. They bear a striking resemblance to *Sciagraphia denticulata*, but are slightly larger, though I recognized them on sight as something new to me. It was described from Colorado, and the entire description is: "A species almost the exact counterpart of *S. denticulata*, Grt., in appearance, from some specimens of which I am not able to distinguish it by colour or markings. It is, however, easily distinguished by the bipectinate antennæ of the male, and the sharply serrate antennæ of the female." It is not unnatural to suppose that *-oides* was the termination which Hulst intended to be printed, but the fact that the name is spelt the same way in the list of species on the same page is at variance with the suggestion.

532. *D. sp. ?*—Rare.

533. *D. sp. ?*—Rather rare. Has rather heavier antennæ than the above, subapical mark less produced, and in the subterminal band more closely resembles No. 534. I had this and the preceding mixed until

recently. Mr. Taylor says concerning them: "Two *Diastictis* of the *inquinaria* group." But he is not able to name them at present. The only female I ever saw of either was bred on July 15th, 1894, from a larva beaten from *Salix* at the mouth of Fish Creek in early spring. This was named *bicolorata* by Hulst, but Mr. Taylor says it does not fit the description. End July and Aug. In the Kootenai list *inquinaria* is recorded from Kaslo. I have seen and compared a series in Mr. Cockle's collection with both these species. One of his specimens is the same as my 533. The others are nearer to No. 532, but have heavier antennæ.

534. *D. loricaria*, Eversman, = *Sympherta julia*, Hulst.—Until two years ago the female of *julia* was unknown. Meanwhile Messrs. L. B. Prout and G. W. Taylor suspected its identity with a European species, and the capture by me at treacle of a female with rudimentary wings, on Aug. 2nd, 1904, which I had reason to suspect of being *julia*, confirmed their suspicions. Mr. Taylor writes: "*Sympherta julia*, Hulst, is really *Dysmygia loricaria*, Eversman, a European species, described in 1837, which has a short-winged female." The species stands in the Staudinger Catalogue under *Thamnonoma*, which now gives place in our lists to *Diastictis*. *Julia* was described from Ontario, Washington, Calgary, Glenwood Spgs., Colo., and Montana. If the reference of the Calgary species is correct, the description is somewhat misleading. To begin with, the description of the genus *Sympherta* says: "Antennæ bipectinate in the male, the pectinations rather short." I know very few species of Geometridæ in which the pectinations are longer, compared with the length of the antennæ. Again, the description of *julia* tells us that "a submarginal whitish dentate line, parallel with outer margin," runs *through* the outer reddish-brown band, "having on the inner side a series of dark spots, especially marked at veins 3 and 4, and at 6 and 7." As a matter of fact, the whitish line, always faint, and sometimes obsolete, is wholly posterior to the band, of which the "series of dark spots," a prominent feature, form the outer border. The species bears a strong resemblance to the preceding (No. 533), but differs in the more heavily pectinated antennæ, the larger, browner and more open discal spot, and more distinctly oval brown spots in the centre band. The males are not rare. Middle July to middle Aug.

535. *D. sp.?*—A small, poorly-marked, smoky brown species, not uncommon near the timber line (6,500–7,000 feet) at Laggan. Mr.

Taylor tells me that he has it also from Banff, and from Yellowstone Park, Wyo., but is unable to name it at present. End July and Aug.

536. *Platæa trilinearia*, Pack.—Fairly common on the Red Deer River bottom in early July, where it may frequently be disturbed from some of the larger species of sages so abundant in that district, including *Artemisia ludoviciana*, on which the larva perhaps feeds. Mr. Taylor comments: "The capture of *Platæa* is interesting. I did not know it before from Canada, except a single B. C. specimen, which I thought might be an error."

537. *Paraphia subatomaria*, Wood.—Four males and a female on Red Deer River between July 2nd and 5th, 1905, chiefly by beating. The males are all more or less worn. The female, which is in good condition, is the largest of the series, and has more obvious scallopings. It closely resembles Dr. Holland's figure of *unipuncta*, which Mr. Taylor tells me is merely a variety of the same species. I had imagined the female to be distinct from the male. My specimens appear to be grayer than anything in Mr. Taylor's series, though similar in pattern.

538. *Spodolepis substriataria*, Hulst.—The name is so spelt in the description, which was taken from a single female from Franconia, N. H. A specimen was taken at Sallow blossom in early spring by Mr. Hudson some years ago. Both Mr. Taylor and Dr. Dyar have seen this, which is defective, but not rubbed, and named it as above. Two more have been taken during the present season. One at Sallow blossoms on April 23rd, the other, slightly rubbed, at light on May 11th. The first capture has the ground colour ochreous, and the black transverse lines very distinct. The two latter are fuscous throughout, and in the darkest of these the transverse lines are rather faint. All these have a whitish discal spot situate in a blackish cloud. The cloud, but not the spot, is referred to in the description. Mr. Taylor writes: "The species is immensely variable. According to Dr. Dyar, *Jubarella Danbyi* must be sunk as a synonym of *substriataria*. There appears, however, to be some doubt as to whether this is the case." Both genus and species of *Danbyi* were described from Rossland, B. C., from a male only, the female being mentioned as "unknown, possibly wingless." "Discal spot white, with edging dark," is a character of *Danbyi*, of which the description otherwise fits the Calgary species pretty well, except that instead of blackish cross lines *Danbyi* is stated to have a few black dashes on some of the veins only. Since receiving Mr. Taylor's note on the subject, I have carefully examined a

splendid series in Mr. Cockle's collection, including both sexes, winged, the species being recorded from that locality in the Kootenai list as *substriataria*. I was unable to make two species out of them, but found the variation enormous. Apart from that in shade and suffusion, the white discal spot was sometimes lost, or nearly so, and the black cross lines, sometimes very conspicuous, were in some specimens almost obsolete, and in one instance reduced to slight black dashes on two veins only.

539. *Selidosema umbrosaria*, Hbn. ?—Five males and a female from Red Deer River, July 1st to 7th, 1905, at light and by beating. Mr. Taylor has one of the males, but in only one of the other four am I unable to detect a hair pencil on the hind tibia. From the fourth it has probably been rubbed off in the pinning. Mr. Pearsall's remarks, in CAN. ENT., XXXVIII, p. 178, (May, of this volume), concerning the absence of hair pencil in Hubner's species, leaves me in doubt as to the correctness of the determination.

540. *Lycia cognataria*, Gn.—Three pairs only have been taken, though it seems at any rate widely distributed in Alberta. At rest and at light, June and early July.

541. *Apocheima Rachelæ*, Hulst.—Four or five males only have been taken, the captures extending over a period of six years. On the wing at daytime, or at rest. Head of Pine Creek, April and early May. Perhaps the earliest of all the spring-hatching Lepidoptera. Described from Colorado, recorded also in Dyar's list from Alaska, and Mr. C. V. Blackburn tells me that he has taken several males at light in early April at Woburn, Mass., the identification having been corroborated by Prof. J. B. Smith, who I believe has the type. So it appears to have a wide range. Mr. Taylor tells me that the female is wingless, and that he has it in his collection. I have not taken it near salt springs, as Mr. Bruce did in Colorado.

542. *Dyscia orciferata*, Walk.—Common, but more so on the prairies than in the hills. A day flier. June and early July.

543. *Anagoga pulveraria*, Linn.—Two specimens, both taken near mouth of Fish Creek, June 6th and 7th, but at an interval of ten years. I collected there for two years, and only remember seeing one, but I cannot be sure that it is not common there some seasons.

544. *Sicya macularia*, Harr.—Common. End July to early Sept. A very variable species, with a striking dissimilarity between the sexes. I have the name "var. *crocearia*" from Hulst, but cannot be sure to which form it refers.

545. *Metrocampa perlata*, Gn.—Very common, sometimes rather abundant, particularly in poplar thickets. Dusk, and occasionally at light, in July. This, Mr. Taylor tells me, is the common and widely distributed pale green species standing in our lists as *prægrandaria*, Gn., and is the N. American representative of European *margaritata*, Linn. But *prægrandaria*, he says, was described as a reddish flesh-coloured species, with thorax sulphur-yellow. The species seems to be unknown, and the description may have been from a European specimen (*honoraria*, Schiff.) in error.

546. *Ennomos magnarius*, Gn.—Not common. End Aug. to middle Sept. Light. Mr. Hudson bred a fine female from a larva feeding on *Populus tremuloides*.

547. *Xanthotype crocataria*, Fabr.—Not rare on the Red Deer River in early July, 1905, but getting rather worn. Taken principally at light, and apparently all males. Most of the specimens are more heavily banded, but less speckled, than Dr. Holland's figure, and a few closely resemble that of var. *cælaria*.

548. *Hyperitis amicaria*, H.-S.—In about equal numbers to the preceding species, at the same time and place, but taken almost entirely by beating willow bushes in the daytime.

549. *H. trianguliferata*, Pack. = *notataria*, Hulst. Not common. End May to early July. Daytime and light. I have a specimen which was returned to me as "*trianguliferaria*, var. *notataria*," by Hulst, though in his "Classification," published a year later, he lists the names as distinct. The specimen is a male, and has a well-marked dark spot on inner margin of primaries, which in others of my series is entirely lacking. I have only five males and a female at present under examination, but the series is such as to convince me that the extremes are one species. Dr. Dyar, in the Kootenai list, draws the same conclusion from a long series taken in the Kaslo district. I never suspected the existence of two amongst my local material. The use of either as a varietal name is, however, superfluous, as Mr. Taylor writes: "Packard's type of *trianguliferata* is the form afterwards described as *notataria* by Hulst. The *trianguliferata* of Hulst (nec Pack.) is the less spotted var." *Notataria* is therefore a synonym, as both names refer to the form with the spot on hind margin.

550. *Euchlæna obtusaria*, Hbn.—Not rare at light on the Red Deer in early July, 1905.

551. *E. Johnsonaria*, Fitch.—Comes freely to light, and flies at dusk. July.

552. *E. astylusaria*, Walk.—A male on the Red Deer, July 8th, 1905, slightly rubbed.

553. *E. pectinaria*, Schiff.—A fine male at light in the same locality, on July 5th.

554. *Selenia (Eutrapela) alciphearia*, Walk. — Common some seasons, notably in 1900 and 1906, but sometimes rare or absent. Light and dusk May.

555. *Pherne jubararia*, Hulst.—Two males on the wing after dark, Sept. 17th, 1903. Mr. Taylor tells me that it occurs on Vancouver Island, and "has been passing in collections as *Sabulodes aurantiacaria* and *S. cervinaria*." The specimen of these two, which is now in my collection, and which Mr. Taylor has seen, has much less of the ochreous coloration than the figure of the female type in Dr. Holland's book, and the outer line is rather less waved. A third male, taken at light on Sept. 30th, 1904, is slightly rubbed, and bears a much closer resemblance to Dr. Holland's fig. of *placearia*, and has almost immaculate secondaries. Mr. Taylor has not seen this, and I dare not separate on the one specimen.

556. *Metanema inatomaria*, Gn.—A pair near Billings's mill, June 26th, 1898.

557. *M. determinata*, Walk.—Rare. Early June to early July.

558. *Azelina ancetaria*, Hbn.—Not common. June and July. Light.

559. *Sabulodes lorata*, Grt.—A female, much worn, on the Red Deer, July 1st, 1905. The wings seem longer, and are more falcate, than in Dr. Holland's figure.

560. *Brephos infans*, Möschl.—Taken by Mr. Thomas Baird, of High River, Alta., and at Banff by Mr. N. B. Sanson. Both on the authority of Dr. Fletcher. (Rep. Ent. Soc. Ont., No. 19, p. 96, 1902.)

PSYCHIDÆ.

561. *Hyaloscotes* (?) *fragmentella*, Hy. Edw., = *fumosa*, Butl.—A specimen flying in hot sunshine near the summit of Mt. St. Piran, Laggan, at about 8,500 feet, on July 20th, 1904. The specific synonymy is on the authority of Dr. Dyar, who has seen my specimen, and in returning it commented: "It is *Chalia fragmentella* and *Hyaloscotes fumosa* combined."

COSSIDÆ.

562. *Cossus Centerensis*, Lint.—A rather worn male at light, July 18th, 1902. The specimen was so named by Dr. Barnes, and is not unlike Dr. Holland's figure of that species. Dr. Fletcher has seen it, and doubts the correctness of the name, saying: "It looks too clean."

563. *C. populi*, Walk. ?—Probably not rare. A large number of balsam-poplar trunks *(P. balsamifera)* are burrowed with what I believe to be this species. I have bred a few from larvæ taken from split wood, or rather left in blocks of sawn or split wood. If removed from their burrows the mortality amongst them will probably be high. Dr. Ottolengui has the species from me, but could not name it with certainty, and I have a specimen referred doubtfully to *populi* by Dr. Dyar. Two males and a female are all I have now in the collection, and they show considerable variation. Two males only have been taken at light, which has not been worked near their breeding ground, and besides these I have never met with any except by breeding. July and early Aug.

564. *Prionoxystus robiniæ*, Pack.—One female in a freshly-built Cottonwood *(Populus deltoidea)* log building on Red Deer River, on June 21st, 1901.

SESIIDÆ.

565. *Bembecia marginata*, Harr.—A pair at rest on a Cottonwood trunk on Red Deer River on July 10th, 1904. Dr. Dyar has seen the male.

566. *Albuna pyramidalis*, Walk.—One specimen near Billings's mill, July 10th, 1898.

HEPIALIDÆ.

567. *Sthenopis argenteomaculatus*, Harr.—I have a male in the collection taken near the head of Pine Creek in 1894, which has been so named by Dr. Dyar. Mr. Hudson took others, but says he never saw it anywhere but in one valley. I do not think that Alder, in the roots and stems of which the larva is said to feed, grows within four miles. It has not been met with in the same district for nine or ten years, but the locality has not been visited specially for it. Mr. C. Garrett seems to have found it not uncommon on Fallen Timber Creek, 20 miles west of Didsbury, in 1904, and I am indebted to him for two males and a female. One male is in colour exactly like Dr. Holland's figure of the species. All other specimens I ever saw, including the Pine Creek specimen named by Dr. Dyar, are smoky brown, with very little or nothing of an ochreous

tinge, and my only female has the darkest markings almost black, as dark, in fact, as the darkest in *Prionoxystus robiniæ* in the figure Dr. Holland shows just above this species. The ochreous Didsbury specimen I picked out of about a score of pale ochreous and salmon-tinted *4-guttatus* and smoky-gray and brown *argenteomaculatus* as the nearest approach I ever saw to a connecting link between the two. It is, in fact, about intermediate, though I saw no intergrades with either extreme, and I was much surprised to find that it so closely resembled the figure in the "Moth Book." Flies at dusk in July.

568. *S. quadriguttatus*, Grt.—Fairly common some years, and seems to be generally distributed where there are willows, on the roots and in the stems of which the larva feeds. Mr. Heath tells me that he has found larvæ in roots of several other shrubs as well. I have no specimens quite as pale in ground colour as Dr. Holland's figure. Flies at dusk in July. Sir George Hampson said of a specimen I sent him: "*Argenteomaculatus*, not *quadriguttatus*," but I have not further investigated the matter.

569. *Hepialus hyperboreus*, Möschl?—About twelve years ago I used not to look upon this species as a rarity, but only one specimen has been seen for a good many seasons, on October 3rd, 1897. This and another defective specimen labelled "1894" are all I have. Dr. Dyar gave me the name *gaunia*, a European species of Hubner's, of which *hyperboreus* was at that time considered a variety. My use of the above name is not authentic.

A RARE CARABID = *PLATYNUS QUADRIMACULATUS*, HORN.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

Among a collection of beetles made by the late Dr. F. Stein, of Indianapolis, I found some years ago a specimen marked "*Platynus, sp?* Indiana." Finding no description fitting it in Dr. Horn's revision of the genus,* I sent it among other specimens for naming to Dr. E. A. Schwarz, of the U. S. Division of Entomology. Under date of January 17, 1899, he wrote me that it was *Platynus quadrimaculatus*, Horn; that it "was not represented in the U. S. National Museum collection, and that only a few specimens had ever been captured."

On April 20, 1904, I was much pleased to find a second specimen beneath a chunk on a wooded slope bordering the flood plain of the

*Bull. Brooklyn Ent. Soc., V., 1882, p. 63.

Wabash River, near Grand Chain, Posey County, Indiana. Snow a foot or more deep fell during the ensuing night and lasted several days, precluding further search at the time. Grand Chain is not a post office, but a series of rapids in the Wabash, about 20 miles above its mouth, and about seven miles below New Harmony, the home of Thomas Say. The Government has here done much work in trying to render the river navigable. For a number of years, about 1880, this work was under the supervision of Dr. Stein, and his specimen was doubtless secured near the same place.

I can find no reference to *P. quadrimaculatus* in any list or paper other than the original description by Horn.† He described it from a single female "collected by Mr. Klages, February 27, 1881, under the bark of a fallen gum tree near Owensburgh, Kentucky (banks of the Ohio River, near Louisville)." Grand Chain is about 45 miles north west of Owensboro, Kentucky, which is probably the town which Dr. Horn had in mind. The beetle doubtless belongs to the Austroriparian Fauna of the Lower Austral life zone, which extends over the greater part of the southern third of Indiana,‡ and should be sought for on the wooded slopes of the larger streams in early spring.

Quadrimaculatus is the most handsome of the 38 species of *Platynus* which I have taken in Indiana, reminding one of some of the more highly-coloured members of the genus Badister. Its most salient characters as given by Horn are as follows:

"Rufo-testaceous, sides of abdomen piceous, head black, elytron black, with a large humeral spot confluent with that on the opposite side, another very little smaller near the apex. Thorax somewhat cordiform, a little longer than wide, narrower at base, apex feebly emarginate, base truncate, sides in front arcuate, posteriorly sinuate, hind angles rectangular, but not prominent, an extremely narrow reflexed margin. Elytra oval, broader behind, humeral angles much rounded, body feebly winged, striate, striæ obsoletely punctured, intervals flat, alutaceous, dorsal punctures three, on the third interval close to the third stria. Length, 7.5 mm."

†Trans. Amer. Ent. Soc., XII., 1885, p. 130.

‡See article entitled "The Life Zones of Indiana as Illustrated by the Distribution of Orthoptera Within the State," in the author's "Orthoptera of Indiana," 1902, p. 461.

FOUR OCHODÆUS NEW TO THE UNITED STATES.

BY CHAS. SCHAEFFER, MUSEUM OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES, BROOKLYN, N. Y.

Working over some neglected material, I found, to my surprise, that the specimens of *Ochodæus* collected by me last year in Arizona are separable into three distinct species, none of which agree with the descriptions of the North American species. A few years ago my brother sent me from California, with some other material, two specimens of what I take to be an *Ochodæus*. Unfortunately, I misplaced one of the specimens, and not wishing to dissect the single remaining one, I leave this species in this genus for the present, till more material is available.

Ochodæus planifrons, new species.—Male: Ferruginous-brown. Head sub-convex, granulate; clypeus short, transverse, broadly arcuate-truncate in front, feebly sinuate at sides, frontal margin single, clypeal suture feebly impressed, but visible; labrum deeply arcuate-emarginate. Prothorax moderately densely granulate, and with very short stiff semi-erect hairs, median impression obsolete. Elytra punctate-striate, intervals feebly convex, not densely punctate, punctures irregularly placed, each bearing a coarse, short hair, these are slightly longer at apex and sides than on the disk; sutural angle obtuse. Propygidium with a longitudinal, nearly parallel, median groove, apical margin strongly beaded. Mentum slightly longer than broad, deeply, longitudinally concave at middle. Prosternum arcuate-truncate in front. Anterior tibiæ tridentate, the upper tooth very small, and nearer the base than the second tooth. Posterior femora with a triangular tooth at apex; posterior tibiæ, inside at about apical fourth obtusely toothed or rather angulate; first joint of hind tarsi long, elongate. Body beneath moderately clothed with long hairs.

Female: Differs only from the male by having the hind tibiæ simple, the hind femora at apex with a smaller and more obtuse tooth and the clypeus slightly broader.

Length, 5 mm.

Huachuca Mts., Arizona. July and August.

This species, by the form of the male hind tibiæ, is very distinct from the described species, and is best placed after *Ulkei* in Dr. Horn's table.* The size, as usual, is variable; some are larger than the above measurement,

*Trans. Am. Ent. Soc., Vol. V., p. 180.

others smaller; in the larger specimens the angulation on inner side of hind tibiæ is more prominent than in the smaller specimens.

Ochodæus inarmatus, new species.—Brownish-ferruginous. Head and clypeus coarsely rugose, front with a short transverse carina, which is emarginate at middle; behind the carina the surface is less coarsely sculptured than before; clypeus hemihexagonal, margin single, clypeal suture distinct, but feebly impressed. Labrum broadly, not deeply emarginate. Prothorax relatively coarsely and densely granulate and with very short recumbent hairs. Elytra striate-punctate, intervals feebly convex, moderately coarsely punctured, punctures irregular, and each bearing a short setiform erect hair; sutural angle sinuate. Apical margin of propygidium narrowly interrupted at middle with a small acute tubercle on each side. Mentum longer than broad, deeply longitudinally impressed from base to apex, the latter broadly emarginate. Prosternum arcuate in front. Posterior femora and tibiæ simple. Body beneath sparsely clothed with moderately long hairs.

Length, 7 mm.

Huachuca Mts., Arizona. July and August.

The head behind and before the emarginate frontal carina is shallowly impressed. The two sexes do not seem to differ, except that the head in what I consider the female is less distinctly carinate and hardly at all impressed before and behind the carina; otherwise there is scarcely any difference in the large series before me, except in size. The measurement is taken from one of the larger specimens. This species has to be placed with *peninsularis*, near *biarmatus*, in Dr. Horn's table, from both distinguished principally by the emarginate frontal carina of the head. From the Mexican *luridus*, which has a similar armature of the head, it differs by the coarsely-sculptured head, the irregular punctuation of the elytral intervals and the larger upper tooth of the anterior tibiæ, which is situated nearer the second tooth than the base.

Ochodæus præsidii, Bates, Biol. Cent. Am. col., Vol. II., pt. 2, 106.—Male: Ferruginous. Head coarsely cribrately punctate; front with a feebly-indicated carina; clypeus very narrow, with a double margin, the posterior margin more elevated and slightly more prominent at middle and at sides. Labrum feebly emarginate in front. Prothorax densely asperately punctate, with short semi-erect hairs and a posteriorly deeply-impressed dorsal line. Elytra punctate-striate, intervals feebly convex,

with irregular, not densely-placed punctures, each puncture with a recurved hair, finer and longer than in the preceding species; sutural angle obtuse. Propygidium longitudinally-grooved at middle, the sides of which are strongly divergent in front. Mentum as long as broad, suddenly narrowed in front into a small process, deeply impressed in about apical half. Prosternum broadly arcuate in front. Anterior tibiæ tridentate, the upper tooth small and further removed from the second tooth than from the base; posterior femora broad at apex, and with a large, slightly curved tooth; posterior tibiæ broad and somewhat flattened; first joint of posterior tarsi elongate, not curved. Beneath sparsely punctate and clothed with moderately long hairs, the last two segments more densely punctate than the rest of abdomen.

Female: Differs from the male by having the hind femora and tibiæ not as broad and the apical femoral tooth much smaller.

Length, 6.25–6.50 mm.

Huachuca Mts., Arizona. July and August.

Except in some minor characters, the specimens, which I refer to this species, agree well with nearly all the important ones used in separating the species in this genus, as far as given in the description. By the not entirely impressed mentum this species has to be placed with *mandibularis* and *frontalis*; from the first it differs by the form of femora and tibiæ and the different clypeus; some of these characters separate it also from *frontalis*, besides the different mentum. The frontal carina is at best feeble, and in some specimens entirely absent.

Ochodæus estriatus, new species.—Elongate, testaceous. Head flat, unarmed, densely punctate; clypeus very short, reflexed, clypeal margin single, thickened, arcuate; labrum strongly transverse, broadly emarginate. Prothorax punctate, punctures well separated, median line impressed, obsolete near apex. Elytra irregularly, not very densely punctate, without striæ, except an impunctate sutural, surface pubescent with fine, short hairs; sutural angles rounded. Prosternum in front subangulate at middle. Anterior tibiæ strongly tridentate; intermediate tibiæ strongly dilated towards apex and shorter than the femora; posterior trochanters prolonged into an acute process, posterior femora with a triangular, obtuse tooth slightly before apex, posterior tibiæ simple, broad and short, outer side straight, inside arcuately widening to apex; first joint of posterior tarsi elongate, as long as the three following joints; spurs of middle and

hind tibiæ dissimilar, the outer is slender and the inner pectinate on its inner margin. Body beneath, especially the abdominal segments, densely hairy.

Length, 7 mm.

Millwood, Fresno Co., California. One specimen collected by my brother.

The more elongate form, the short, strongly-widening middle and hind tibiæ, the spinous hind trochanters, the elytra without striæ, and the strongly-reflexed or rather strongly-thickened apical margin of clypeus will readily distinguish this from any of the described species ; it is also remarkable by having one spur of both the middle and hind tibiæ pectinate.

This species may require a new genus, but without dissection it was impossible to find characters strong enough for such a course, and till more material is available it is best placed in *Ochodæus*, apparently possessing the characters required for this genus.

NEW SPECIES OF GEOMETRIDÆ.

BY JOHN A. GROSSBECK, NEW BRUNSWICK, N. J.

Stenaspilates flavisaria, new species.— ♂. Expanse, 33–38 mm. Head, thorax and abdomen yellowish-white. Ground colour of wings yellowish-white, in some specimens washed with a fawn-brown tint. Primaries with a dark-ochreous intradiscal line crossing one-third from the base, curved broadly outward from costa, then bisinuous to inner margin. Extradiscal line brown, bounded outwardly by a narrow white line, crossing at the outer third, with a gentle outward and inward curve to cubitus 2, then with a sharp outward semicircle, and another short curve to inner margin. The basal area is more or less shaded by pale brown ochreous, most obvious toward the base of the inner margin. The central area pale ochreous to fawn-brown, darkest at the extradiscal line, becoming paler toward intradiscal line. Discal spot white, linear, distinct. The outer area with a sparse sprinkling of brown scales, the inner portion with a whitish shade at the costa, which also extends more or less through the centre of the area. The outer margin distinctly angulate at media 1 and cubitus 2. Secondaries usually with a transverse line beginning at inner margin and fading away toward costa, which corresponds to the extradiscal line of primaries ; within this line the area is pale ochreous, gradually merging into the ground colour toward the base. Discal spot large, rounded, rather faint. The outer area with a sprinkling

of brown scales, and an indistinct cloud occupying the central portion. Near the anal angle is a distinct black dot. Outer margin of wing sinuous, decidedly scalloped at anal angle. Beneath the wings are yellowish-white, with the outer lines very faint. The discal dot of the secondaries dark brown, large and distinct.

♀.—Expanse, 40–43 mm. Body and ground colour of wings much more yellow than in the male, and entirely lacking the fawn-brown tint; the scattering brown scales, therefore, stand out more in contrast, those of the outer area collecting into numerous short dashes. Lines, discal spots, etc., as in the male. The extradiscal line is, in most specimens, more sharply marked, and the shading of the central area is distinctly ochreous, without tendency toward the fawn-colour, and also much paler in the central portion. In the outer area, running parallel to the extradiscal line, and giving prominence to the narrow white line, is a broad grayish-brown band, which commences a short distance from the costa, and becomes obsolete as it rounds the semicircle. Beneath a broad brownish band crosses both wings, beginning at the costa and extending two-thirds across the wings.

Described from five males and thirteen females, Yavapai Co., Ariz., May 22–31; one male from Minnehaha, Ariz., Aug. 30 (Hutson); and one male from Yuma Co., Ariz., Aug. 26 (Pearsall).

Types, coll. J. A. Grossbeck; co-types, coll. R. F. Pearsall, and in Rutger's College collection.

Seems to be very distinct from any other described species. There is some variation in the intensity of the colouring, several being pale, with intradiscal line of primaries and transverse line of secondaries obsolete, while in others they stand out in bold contrast. The specimen from Minnehaha is exceptionally dark, being heavily washed with gray, and the fawn colour of the median area correspondingly heightened, and at first sight suggests an entirely different insect. One of the earlier captures approaches it somewhat, being intermediate between the two extremes. The capture of this specimen in August seemed at first to be untimely, hence the exceptional colouring; but the later acquisition of a second August specimen from Mr. Pearsall seems to establish a second brood without further doubt.

Stenaspilates Smithii, new species.— ♀. Expanse, 40 mm. Head and thorax brownish-black, with a sprinkling of cinereous scales; abdomen with evenly mixed blackish and cinereous scales except at the apex of

each segment, which is wholly brownish-black. Ground colour of wings grayish, with dark brown scales scattered over the entire surface. Intradiscal and extradiscal lines of primaries as in *flavisaria*, but the sharp outward curve of the latter below cubitus 2 more acute ; both lines black and sharply defined. Another blackish line is traceable crossing the primaries from costa to inner margin, close to their insertion into the thorax. The basal area has an almost even scattering of brown scales, fewer toward the intradiscal line. The inner half of the central area is evenly covered with gray and brown scales, but the outer half is very dark brown, scarcely any cinereous scales showing, and a slightly darker line subparallel to the extradiscal line is faintly seen running through this dark portion. Discal spot pure white, linear, angulate. The outer area is irregularly divided into two distinct colours, the line of division running somewhat the same as the extradiscal line, the inner portion cinereous, with scattered brown scales and a brunneous patch in the centre and toward the costa ; the outer almost wholly brown, with two or three white dots in a line in the centre of the apical half. Secondaries gray, with a faint yellowish cast, sprinkled with fine brown scales, thickest toward the anal angle. A rather strong brown line, edged outwardly with white, extends from the inner margin near the anal angle transversely across the wing to the costa, ending one-fourth in from the apex ; this line becomes narrower and fainter as it nears the costa, and the white border becomes correspondingly weakened. The marginal line is most distinct toward the anal angle, where it appears as three black crescents bordering the marginal excisions. Discal spot absent. Margins of both wings as in *flavisaria*. Beneath the wings and body are dirty gray, with a yellowish tinge, and with fine scatterings of brown scales. On the primaries the white discal spot of upper surface is reproduced, while the extradiscal line is scarcely to be made out. On the secondaries the brown scales form short dashes toward the inner margin and anal angle, transverse line very conspicuous on inner half ; discal spot large, round, dark brown.

Described from one female from Doble, California, taken in August.

Type in Rutger's College, from coll. Dr. J. B. Smith.

This is by far the darkest of all the species of *Stenaspilates* found in the United States, and by that fact alone may be distinguished from its congeners occurring in the same territory. I take pleasure in naming this fine species in honour of Dr. John B. Smith, to whom I am indebted for innumerable kindnesses of all descriptions.

Eucestia fuscata, new species.—♂. Expanse, 24.5 mm. Front, antennæ and thorax fuscous, with a sprinkling of white scales; palpi white at basal and fuscous at apical half; vertex wholly brown. Ground colour of primaries whitish-cinereous, thickly overlaid with fuscous scales. Three parallel whitish lines, the inner beginning one-fourth from the apex on the costa, and terminating one-third from the inner angle on the inner margin, extend obliquely across the wing, curving outward at radius 5, and inward at cubitus 2. These lines are almost obsolete a little below radius 5 to media 2, the innermost showing most plainly. The outer line in the apical portion of the wing deeply scalloped. The terminal line deep fuscous, preceded and narrowly broken by whitish scales. The basal line is represented by an oblique, rather broad mark, in the centre of the wing, slightly nearer the inner margin. The discal spot is deep fuscous, linear. Veins, media 1, media 3 and cubitus 1 are darkened by fuscous scales from the centre of the wing to the inner transverse line. Fringe checkered white and pale fuscous. Secondaries smoky brown, slightly darker at the apex, and with darker squares in the fringe. Beneath it is pale smoky brown, peppered with white scales along the costa and outer margin; the fringe checkered as above.

Described from one male received from Dr. J. B. Smith, taken at Colton, Cal., Feb. 26.

Type in Rutger's College, from coll. Dr. J. B. Smith.

In spite of the close similarity of the markings to *Eucestia rotundata*, I am positive that this will remain a good species. The outward curvature of the transverse white lines and the suffusion of fuscous scales, combine to make the species distinct.

THE SNOW FLY, *CHIONEA VALGA*.

BY C. N. AINSLIE, ROCHESTER, MINN.

From allusions that are met with in papers and letters, the Snow Fly seems to be to most collectors a mythical insect, seldom described and more infrequently found. The late Dr. Lugger claimed to have taken it in Minnesota, but, a short time before his death, when he undertook to show me an example of the insect, it could not be found either in his own or the State collection. It is true he figured it in his Second Annual Report, issued in 1896, but that and the figure in the last State report, 1905, are

somewhat misleading, and fail short of an adequate representation. Indeed, it is next to impossible to represent the fly as it appears in actual life, "ambling" across the landscape, for to my mind it resembles a clumsy little black spider more than anything else.

A neighbour of my boyhood days used to tell me of a fly that he had found at times in the snow, although I believe he called it a "snow flea," but his ideas on other subjects were peculiar, and I gave scant credence to his fly stories. Professor Lugger and I have several times waded patiently through snow, looking carefully for this insect, but never until last Christmas did I ever see one. My son and myself were walking along a little-used road on top of a bluff at the edge of this city late in December last, when we were met by one of these strange fellows, staggering actively along the sleigh track toward us. It was a winter afternoon, the sun almost setting, the snow a foot deep, or more, the surface snow at least ten days old, a cool breeze blowing, and the mercury 15 degrees above zero, Fahr. I recognized him at a glance as I would an old friend, and, gathered him in. It was a male, and when touched feigned death, but in a few seconds started on again. In a vial in the warmth of my pocket it died within a few minutes.

Two days later my son searched the same vicinity carefully during the forenoon and took two more, a male and female, which mated instantly when bottled together. This pair was kept out of doors that night under an inverted glass on snow, but the next morning were both dead, or nearly so. The snow below the glass was carefully melted, but no trace of eggs was found.

The fly appears black when seen against snow, but is really a blackish-gray, the body velvety and soft. The halteres are prominent. The legs are the most striking feature in the make-up of the creature, and are three or four times as long as the body, loosely attached as in the Tipulidæ. The body is about three millimetres in length, besides the antennæ, which are peculiar in shape and are inadequately represented in the delineations referred to above.

The life-history of the Snow Fly has been partially worked out in Europe, but under the conditions of life in which it exists in this vicinity it would certainly be exceedingly difficult to follow successfully, except in rare cases.

SOME BEES FROM WASHINGTON STATE.

BY T. D. A. COCKERELL, BOULDER, COLO.

The State of Washington is remarkable for the possession of two very different faunæ: that of the damp coast region, and that of the inland plains and valleys.* The bees of the coast region have become fairly well known through the collections of Professor T. Kincaid and others, but the inland bee-fauna has as yet yielded to science only a fraction of its riches. On May 25, 1896, Professor Kincaid collected at Pasco, and obtained a remarkable series of specimens, including new species of *Colletes*, *Andrena* (two), *Nomada* (two), *Calliopsis*, *Osmia*,† *Anthophora* and *Emphoropsis*. The results of this single day's work will ever be memorable in the history of Apidology, and from this and other miscellaneous collections, we may fairly assume that the region contains a whole new fauna. Not long ago Mr. Titus passed through Pasco, and found it a desolate-looking place; the region is not one of luxuriant vegetation, but represents the northern extension of the arid desert or semidesert, carrying with it an essentially southern bee-fauna, as shown by *Calliopsis*, *Dasiapis*, *Nomia*, etc.

When Mr. A. L. Melander went to Washington State, I hoped that he would in due course give us an account of the interior country, and make known its real possibilities in the way of Hymenoptera. This he is beginning to do, for the other day I received from Mr. Viereck a box of bees, transmitted to him by Mr. Melander, with the request that they should be worked up. Although I was more than occupied in other ways, they were so interesting that I could not do otherwise than examine them, and I give here part of the result.

Emphoropsis cineraria (Smith).

Yakima, Wash., April 21, 1905. ♀. Previously known only from Vancouver I.

Anthophora.

The following were taken by Eldred Jenne at N. Yakima, Wash., in 1903: *A. Crotchii*, Cr. (May 24); *A. simillima*, Cr. (May 9); *A. urbana*, Cr. (June 26); *A. Washingtoni*, Ckll. (May 27); *A. ignava*, Cr. (May 23); *A. sodalis*, Cr., both sexes (May 27); and *A. Edwardsii*, Cr. (May 9).

*See *American Naturalist*, Jan., 1899, pp. 41–42.

†*Osmia Pascoensis*, Ckll., discovered at Pasco, was taken by me at flowers of *Carduus*, at Boulder, Colorado, July 3, 1905.

The following are from Yakima, Wash., 1905: *A. Edwardsii*, Cr. (April 20 and 21); *A. Crotchii*, Cr. (April 21).

All these appear to be new to the State, except *Washingtoni* and *Crotchii*. The latter is omitted by Mr. Viereck in CANAD. ENTOM., 1905, p. 313, but it was recorded from Pasco in *Proc. Acad. Nat. Sci., Phila.*, 1898, p. 54.

Tetralonia Yakimensis, n. sp.

♂.—Length about 13½ mm.; black, the clypeus (except a deep rounded incision on each side) rather light lemon-yellow, the labrum yellowish-white; hair of head and thorax dullish pale ochreous; abdomen with the first segment covered with very pale ochreous hair, the remaining segments with coarse black hair, with no light hair in front of the apical plate, nor any bands; tarsi, especially the small joints, rufescent; hair on inner side of basal joint orange; basal joint of middle tarsi twisted, and with an apical projection; hind spurs normal. Runs in my tables (Tr. Amer. Ent. Soc., 1906) to *T. Californica* (Cr.), from which it is easily separated by the black hair of second abdominal segment, and absence of reddish hair on apical part of abdomen. By the coloration of the abdominal hair, it resembles *T. acerba*, but that is smaller, and has not the deformed middle tarsi. The closest affinity is no doubt with *T. fulvitarsis* (Cr.), which has just the same leg-structure. *T. Yakimensis* differs from *fulvitarsis* by its more robust form; the hair on second abdominal segment black instead of pale; the absence of a light tuft before the apical plate; the piceous instead of ferruginous nervures; the yellowish (instead of white) hair of legs; the dull disc of mesothorax, with less conspicuous punctures. The facial quadrangle is much longer than broad, the yellow of the clypeus almost touches the eye, and the mandibles have no yellow spot. The antennæ are practically as in *fulvitarsis*.

Hab.—Yakima, Washington State, April 21, 1905 *(Melander)*. Received through Mr. Viereck.

Tetralonia Douglasiana, n. sp.

♀.—Length about 14½ mm., the light pubescence gray to white, only very faintly yellowish on thorax above; hair on inner side of basal joint of hind tarsi clear ferruginous; flagellum very faintly reddish beneath; tegulæ ferruginous, fuscous basally; abdomen with very broad bands of white tomentum on segments 2 to 4; the white band on 5 very broadly interrupted in the middle by dark rufo-fuscous; wings dusky, with a yellow tint, the nervures piceous; no dark hair on mesothorax or

scutellum; facial quadrangle somewhat broader than long; hind spurs pale ferruginous, not at all hooked. The scopa of the hind tibiæ is slightly plumose only, as in *T. Belfragei*. In my tables this runs (making allowance for the large amount of white at sides of segment 5) to *T. Cordleyi*; if sought in the series with the apical hair reddish, it runs to *T. speciosa* or *Cordleyi*. It differs thus from various species which might be confused with it:

1. From *speciosa* by its smaller size, silvery white (not yellow) hair of hind tibiæ, different colour of hair of apex, gray hair of mesothorax, etc. The pale bands on segments 2–4 are as in *speciosa*, except that that on 2 is not appreciably narrowed in the middle, and that on 3 has its upper edge straight (strongly concave laterally in *speciosa*). The bands are also whiter.

2. From *Cordleyi* by the whiter and much broader abdominal bands, the upper lateral corners of the second segment being covered with pubescence; whereas in *Cordleyi* they are broadly black. The hair of the mesothorax is also quite differently coloured.

3. From *Belfragei* by the much broader light bands of abdomen, and the dullish gray aspect of the whole abdomen, instead of the clear black and white of *Belfragei*.

4. From *Fowleri* by the larger size, much broader band on second abdominal segment, etc.

5. From *virgata* by the hair of mesothorax, ornamentation of abdomen, etc.

Hab.—Steamboat Rock, Grand Coulee, Douglas County, Washington State, July 10, 1902. Received from Mr. Viereck, who received it from Mr. A. L. Melander.

Nomia Melandri, n. sp.

♀.—Length about 12½ mm.; hind margins of abdominal segments 2 to 4 with very broad light emerald-green tegumentary bands; first segment with a little green at the hind corners. Closely allied to *N. Foxii*, D. T., but larger (though not nearly so large as *N. Nortoni*), and differing as follows: anterior part of mesothorax with very pale grayish-ochreous hair, with black bristles intermixed; posterior part of mesothorax mainly exposed, shining, impunctate, except for a few large punctures near the region of pubescence, and scattered scarcely visible rudiments of

punctures; scutellum smooth and almost impunctate; apical depression of first abdominal segment bounded above by a strong ridge, which is concave toward the depression (in *Foxii* the depression is less conspicuously bounded, and the boundary is straight); first r. n. entering second s. m. a little beyond the beginning of its last third. Otherwise *Foxii* and *Melandri* are about the same, but the difference of thoracic sculpture makes the latter a very easily-separated species.

Hab.—N. Yakima, Washington State, July 10, 1903, "Yakima Expedition." Sent by Mr. A. L. Melander to Mr. Viereck, who transmitted it to me.

Sphecodes Columbiæ, n. sp.

♀.—Length about 11 mm., of anterior wing just over 7 mm., width of abdomen about 2⅝ mm.; head and thorax black, abdomen long, entirely bright yellowish-ferruginous; legs black, only the small joints of tarsi dark reddish; wings strongly brownish in the region of the cells; flagellum stout, the apical half obscure reddish beneath; third antennal joint longer than fourth, and somewhat longer than broad; labrum broad, not emarginate, nor much produced; mandibles stout and blunt, wholly without an inner tooth; clypeus with very large partially-confluent punctures. This was taken, at first sight, for *S. Kincaidii*, but it is not that species. With the large size and simple and dark mandibles of *Drepanium*, it combines the ordinary labrum of *Sphecodes*, etc. It agrees with the description of *S. Kincaidii* except as follows: Size smaller; face with scanty dull white pubescence, but also coarse black bristles; antennæ not wholly dark; first joint of flagellum not so short; mandibles simple; mesothorax with large strong punctures on a shining ground posteriorly, but rugose anteriorly; tegulæ with hyaline margins; stigma ordinary, not especially large; hind tarsi not all red; second abdominal segment with small close punctures basally; third punctured like the second, except that the area of small close punctures is larger. The first segment, and the second and third except basally, have scattered strong punctures on a very shiny ground; apex with dark hair; apical plate small and narrow; second submarginal cell very narrow, much higher than broad, receiving the first r. n. near the beginning of its last third; area of metathorax hemispherical in outline, regularly cancellate, with a very sharp and definite rim. By reason of the area of metathorax, the smooth sparsely-punctured base of abdomen, etc., one is reminded of *S. arroyanus*, which, however, differs from *S. Columbiæ* by the shorter area of

metathorax, with much less definite cancellation, the paler hair of apex of abdomen, the copious pale hair of face, the shining and strongly-punctured anterior part of mesothorax, the smaller and darker tegulæ, etc.

Hab.—Grand Coulee, "Columbia River," Washington State, July 12, 1902. Sent by Mr. Melander to Mr. Viereck.

Dasiapis ochracea, Ckll.

♂.—N. Yakima, Washington State, June 26, 1903, two *(Eldred Jennie)*. Like a *Diadasia*, but the clypeus of the male is cream-coloured. Not previously known north of New Mexico and Arizona; it well illustrates the northward extension of the southern fauna in the interior region west of the Rockies.

Nomada Jennei, n. sp.

♂.—Length about 8 mm., anterior wing just over 6; black, with creamy-white markings; thorax and upper part of head coarsely rugoso-punctate; abdomen very finely and closely punctate, giving it a dullish and rough appearance, though the punctures are strong and perfectly distinct, as seen with the compound microscope; head broad; eyes pale gray; middle of face with conspicuous appressed silvery-white hair; labrum, basal part of mandibles, clypeus and lateral face-marks creamy-white; mandibles simple, dark at apex, with bright ferruginous between the dark and the light; no supraclypeal mark, except a faint and suffused reddish spot; a black notch at upper junction of clypeus and lateral marks; lateral marks narrow except at base, ending at level of antennæ, the end broadened and obliquely truncate; scape fairly stout, creamy-white in front; flagellum ferruginous, suffused with black above, its first joint scarcely half the length of second (slightly over half on the long side, but conspicuously less than half on the short); tubercles, a pair of minute and obscure dots on upper part of prothorax, and a pair of large round mammiform elevations on scutellum, creamy white; metathorax all black; pleura with a large transverse ferruginous patch, on which are two large creamy-white patches; tegulæ testaceous, with a large creamy-white mark; wings clear, with the apex dusky; stigma amber-colour, nervures fusco-ferruginous; b. n. meeting t. m. slightly to the basad side; second s. m. broader above than third, and receiving the first r. n. a little beyond its middle; legs ferruginous, marked with black and creamy-white; all the tibiæ have the apex externally broadly white; the hind tibiæ are dark, with the base and apex white; the anterior and middle femora have the lower margin broadly blackened for about the basal two-thirds, but on the

apical third is a white dash; tarsi all red; abdomen black at base, but the other dark parts largely reddish, though never bright; each segment has a broad creamy-white band, those on the first two interrupted by a red line in the middle; the first three bands have a dark notch sublaterally on the posterior edge; the fourth has a dark spot on each side; and the fifth has the notch deep and on the anterior edge; apical plate notched; venter ferruginous, banded with white.

Hab.—N. Yakima, Washington State, Sept. 26, 1903 *(Eldred Jenne).* The abdomen is marked and coloured much as in *N. Crotchii*, var. *nigrior*, but the sculpture is different. The closest affinity is probably with *N. Pascoensis*, which is quite differently coloured. Although the anterior coxæ are not spined, they have a minute red tubercle, only distinctly seen with the compound microscope, and I believe the insect is not without real affinity to *Micronomada.*

THREE NEW SPECIES OF BEES.

BY J. C. CRAWFORD, DALLAS, TEXAS.

Perdita Cockerelli, n. sp.—♂. Head and thorax green, finely roughened, metathorax sometimes more bluish; face up to antennæ, including labrum and mandibles, except tips, lateral face-marks running to a point about half way between point of insertion of antennæ and summit of eyes, narrow inferior orbits half way up, scape in front, large spot on tubercles, connected with a spot on prothorax and also with coxal cavity, spot on tegulæ, all of legs except black stripe on rear of anterior and intermediate femora and tibiæ and basal half of all coxæ, yellow; black stripes on front and rear of hind femora connected below, hind tibiæ black, with a yellow stripe in front, flagellum reddish testaceous below; wings milky hyaline, nervures pallid, costa, radius more or less and margin of stigma brownish; tegulæ pallid; pubescence of head and thorax long, white, abundant on pleura and cheeks, tarsi yellowish testaceous, hind tarsi dark; abdomen brownish black, segments 1–5 with yellow bands narrowly interrupted medially; that on 5 sometimes reduced to two spots; venter yellow, tip dark.

Length, 5½ to 6 mm.

♀.—Similar to ♂ in colour, the markings cream coloured and confined to following: clypeus, except two dots and two longitudinal lines parenthesis shaped, not reaching base of clypeus or these connected with the dots or broken medially, supraclypeal mark two dots, or these

connected or entirely absent, lateral face-marks as high as insertion of antennæ, mandibles basally, spots on prothorax and scape in front, knees, line on front of anterior and intermediate tibiæ; bands on segments 1–4 slightly yellowish, interrupted, sometimes widely, that on 5 reduced to two dots or absent; nervures somewhat darker than in ♂; pygidium red; abdomen black; legs black, tarsi dark.

Length, 8 to 8½ mm. Type locality, West Point, Nebr.

Seven females with supraclypeal marks; five females without; eight males; all on *Grindelia squarrosa*. Sexes taken in copula.

This is ♀ *Bruneri* "larger than usual" of Professor Cockerell in the Entom., XXXIV, 190, July, 1901. *Bruneri* ♀ is smaller, has the supraclypeal mark always present and square (*Cockerelli* usually has it, but only as two spots, or these partly connected, never entire); abdomen black, markings with no yellow tinge; *Bruneri* ♂ is easily distinguished by the face being yellow for some distance above antennæ; hind legs with no yellow. The female runs in Cockerell's Tables of New Mexico Bees to *verbesinæ* when without supraclypeal mark; with it to *affinis* ♀ var.; the male runs out of the table at 28 when counting nervures pallid, and when dark at 32.

Neopasites Robertsoni, n. sp.—♀. Black, dull, coarsely and closely punctured, face above antennæ, mesothorax, scutellum and post-scutellum above, appearing reddish-brown from short fine silky hairs; face below antennæ, line on prothorax, median and parapsidal grooves anteriorly, most of mesopleura, posterior angles of mesothorax, edges of scutellar lobes, edges of post-scutellum, sides of metathorax and coxæ with white appressed scale-like pubescence; clypeus anteriorly, mandibles, tibiæ and tarsi light reddish; antennæ beneath and tubercles slightly darker; tegulæ largely reddish; scutellum deeply bilobate; wings dusky, nervures and stigma dark; second submarginal narrowed fully two-thirds to marginal; femora dark; apical margins of abdominal segments reddish, inclining to golden; segment 1 with two large spots of appressed white pubescence on disc connected anteriorly with two small spots on the lateral margins; segments 2–5 with four small almost equidistant spots of similar hair, the outer ones being on the lateral margins of the segments; apical segment truncate; ventral segments with the apical margins reddish.

Length about 4½ mm. Lincoln, Nebr., Aug. 27, 1902; on Solidago.

♂.—Similar to ♀; legs more testaceous; first recurrent nervure received well before the base of the 2nd submarginal cell, not at base as

in the female; median pair of spots on segment 1 smaller, apical dorsal segment narrow, rounded at tip.

Length slightly more than 4 mm. West Point, Nebr., Aug. 30, 1903; on Solidago.

Distinguished from *heliopsis* by being smaller, not so closely punctured, large spot of pubescence on pleura, reddish tinge of head and thorax above, spots on abdomen white, not tinged with yellowish, lighter coloured legs, etc.

Halictus pruinosiformis, n. sp.— ♀. Entirely bright green, pubescence rather abundant, white; facial quadrangle about square; face closely, rather coarsely punctured; antennæ dark; mesothorax finely lineolate, coarsely, rather closely punctured; metathorax with coarse, very irregular striæ not quite reaching apex, the apical part rather coarsely roughened; truncation not surrounded by a salient rim; wings hyaline, stigma honey colour, subcosta dark, nervures very light, those surrounding the marginal cell darker; tegulæ dark brown; legs dark, pubescence white; hind inner spur light-coloured, with about four long teeth; abdomen finely closely punctured, first segment more sparsely so, apical margins of segments testaceous; abdomen, except discs of segments 1 and 2, covered with white sub-appressed pubescence; very often this pubescence is worn almost entirely off.

Length about 6 mm.

♂.—Similar to ♀; facial quadrangle slightly longer than broad, only slightly narrowed below; antennæ reddish testaceous beneath; clypeus anteriorly dark; nervures as in the female, but the darkened ones darker and more contrasting: metathorax roughened at base, and with a median longitudinal line not reaching apex; on each side of this there is a depression, so that it appears as if the line divided at rear and ran laterally and then to front, leaving a narrow smooth shiny border; abdomen, including the first segment, more distinctly and coarsely punctured than in the female, and only sparsely pubescent.

Length about 6 mm. Types: Fedor, Texas, March 8, 1902 (♀); May 17, 1904 (♂). (Birkmann coll.)

Paratypes: Fedor, Texas; Boulder, Colo. (W. P. Cockerell.)

This species is the colour of *pruinosus*, but the wider facial quadrangle and coarse punctures of the mesothorax separate it in the female; the male has a much wider face than *pruinosus*, and has the metathorax much less rugose.

ON WING-VEIN NOMENCLATURE.

BY JOHN A. GROSSBECK, NEW BRUNSWICK, N. J.

It will be noticed that in the preceding paper on Geometridæ, I have used the Comstockian terms for designating wing-veins. Heretofore these have not been used by any writers on this family of moths; in fact, they have been very little used by writers in any family. The reason for this is, not that the system is not a good one, but because it is comparatively new. Most of the older writers have become used to the number system, having employed it in all their previous work, and therefore retain it to preserve uniformity, and perhaps make no effort to familiarize themselves with the new dispensation.

There is no reason, however, why the new generation of entomologists should not adopt a system of nomenclature which, as it applies to insects of all orders, is obviously a more natural one. Dr. John B. Smith, a rather conservative entomologist in my opinion, has, in the Glossary he has just completed for the Brooklyn Entomological Society, laid the foundation for the more general adoption of the new system by using one of the plates to illustrate wings of various orders, and attempting to reduce all terms defined in the text to terms used in these figures. This is an obvious step toward bringing the system into more general use, though Dr. Smith, as an older entomologist, may continue to use the number system in his future work on Noctuidæ. The number of synonyms to the few names Prof. Comstock employs to cover the entire wing venation is surprisingly great (as may be seen by referring to the above-mentioned Glossary), and there could be no better illustration of the need of bringing the terminology to a simple and rational basis.

SINGULAR LOCALITY FOR A WASP'S NEST.—On Mount Royal, on the outskirts of Montreal, there are two large cemeteries, the Roman Catholic and the Protestant. In the former, far up in a lonesome spot among the trees is a Calvary—three huge crosses; the centre one bearing a life-size figure of the Saviour, and the two side figures representing the two thieves. One thief—the penitent one—is represented hanging his head as if dead, the other thief as living and railing at the central figure. For several years past, hornets have each summer built a nest immediately at the back of the impenitent thief, between the hollow of the back and the cross, and can be seen flying in and out from each side during the whole season. So far they have never built a nest behind the other two figures, and the faithful in the city attach great significance to this curious circumstance.

At another piece of sculpture representing the tomb at Gethsemane, with a recumbent figure of the Saviour, there is a bush with a branch hanging over the tomb, and on this a yellow bird has built its nest. The selection of sites by wasps and bird is regarded as being very remarkable and suggestive. M. WARING DAVIS, Montreal.

BOOK NOTICES.

ENTOMOLOGY, with special reference to its Biological and Economic Aspects.—By Justus Watson Folsom, Sc. D., Instructor in Entomology at the University of Illinois. Octavo, pp. 485, five plates and 300 other illustrations. P. Blakiston's Son & Co., 1012 Walnut Street, Philadelphia. (Price $3.00.)

Of recent years a number of text-books, more or less complete, have been placed before the public, but none has been prepared with the object that the author of this new work has in view. The Insect Book, the Butterfly and Moth Books, Comstock's and Kellogg's Manuals, all treat of insects largely from the systematic standpoint, detailing their information according to families. Packard's valuable "Text-book" reviews our knowledge of structure and development. Smith's Entomology is our most complete economic book. But the vast array of facts and the many theoretical problems that have appeared in various publications concerning the other phases of insect study, have never before been accumulated and digested in any American text-book.

Dr. Folsom is a teacher, and has prepared his book principally to fulfil the requirements of certain college courses in entomology, which have not hitherto possessed a comprehensive text-book. Accordingly, the Classification of Insects, which has been so fully treated in the above-mentioned works, serves but for a short introductory chapter, and is followed by two long chapters, occupying about a third of the volume, on Anatomy and Physiology, and Development. When the student has mastered this portion of the book, his laboratory work will have afforded him a sufficient acquaintance with a large number of typical insects to enable him to appreciate the remainder, which is the really distinctive part of the work. To the collector and general reader of the CANADIAN ENTOMOLOGIST, who may not have access to libraries, or have had the advantage of a college course, but who do know the haunts and habits of the insects they search for, this portion of the work will prove an inspiration. The titles of the chapters, which alone we give, should certainly stimulate a desire to penetrate further and learn the impartial consideration that the author has given to the problems of entomology. The following are the subjects of chapters 4 to 13: Adaptations of Aquatic Insects, Colour and Coloration, Adaptive Coloration, Origin of Adaptations and of Species, Insects in relation to Plants, Insects in relation to other Animals, Interrelations of Insects, Insect Behaviour, Distribution, Insects in relation to Man.

These several topics may be treated of in other works, but in none so completely as in the more than two hundred pages that Dr. Folsom devotes to them. The volume concludes with a very full classified bibliography and a necessary index. The plates and other illustrations, a large number of which are original, are excellent, and add greatly to the value of the work. A. L. MELANDER.

We wish to add our testimony to the excellence of Dr. Folsom's new work on Entomology. As a text-book it covers a field hitherto unoccupied, and will, we are sure, prove most useful to teachers and students in scientific and agricultural institutions, and will also be found instructive and interesting by all who are in any way devoted to the study of insects. It should find a place on the book shelves of every working entomologist, and when there will be constantly referred to and consulted. It is written in a clear and attractive manner, and is replete with information gathered from many sources, and including the most recent discoveries and investigations. We congratulate the author on the completion of an admirable piece of work, for undertaking which he deserves the grateful thanks of all North American entomologists. C. J. S. BETHUNE.

EXPLANATION OF TERMS USED IN ENTOMOLOGY.—Prepared by John B. Smith, Sc. D., Professor of Entomology in Rutgers College, etc. Published by the Brooklyn Entomological Society, Brooklyn, N. Y. (Price, $2.00.)

Every Entomologist has, no doubt, been at a loss from time to time regarding the exact meaning of some term that he has met with in a descriptive article on some group of insects in which he is interested. He may have been able to guess the meaning from its obvious derivation from Greek or Latin, or to ascertain it by consulting a comprehensive dictionary. On the other hand, his knowledge of classical languages may be slight and no library may be available, and thus he is left in doubt regarding the term which is of much importance to a right understanding of the article. Thanks to Dr. Smith's careful work, he may now be relieved of this difficulty; the Glossary just published will fulfil all his wants in this respect and a reference to it will give in a clear and concise form the meaning of the hitherto unknown term.

The volume contains over 150 pages, and at a rough calculation between four and five thousand terms. We have tested it in many cases and have also dipped into it at random here and there; in every instance

we have found the word looked for and been satisfied with the definition given. As the author states in the preface, the work cannot, in the nature of things, be regarded as perfect or complete, but it is as nearly so as one can expect, and every one who discovers an error or omission should at once make it known to the author in order that when another edition is published the highest possible standard may be reached.

The four plates at the end of the book will be found most useful. They show the Structures of the External Body Wall of several typical insects, those of the Head, Mouth, Thorax and Genitalia, the Venation according to the Comstock system, and the Nomenclature of Colours.

C. J. S. B.

Bulletin of the British Columbia Entomological Society.—No. 2, June, 1906.

The second quarterly issue of this four-page publication has been received. It contains a valuable paper on "System in Collecting," lists of remarkable captures, Notes on the Season, etc., and a continuation of the B. C. List of Coleoptera, comprising the Buprestidæ, and the beginning of the Diptera, families Bombyliidæ and Therevidæ. The spring meeting was held at Duncan's on April 19. Our friends on the Pacific Coast are certainly working enthusiastically and diligently exploring their most interesting province of the Dominion.

Studies in the Genus Incisalia.—Mr. John H. Cook regrets to announce that he will be unable, through pressure of other work, to continue this series of papers until autumn. The next instalment will be published in October or November.

CHANGE OF ADDRESS.

All correspondence, books, exchanges, etc., for the Entomological Society of Ontario or the Canadian Entomologist, should in future be addressed to

Guelph, Canada,

and not, as heretofore, to London, Ontario.

Mailed August 3rd, 1906.

The Canadian Entomologist.

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PRACTICAL AND POPULAR ENTOMOLOGY.—No. 16.

THE OYSTER-SHELL BARK-LOUSE.

BY TENNYSON D. JARVIS, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

The purpose of this article is to place before the fruit-growers and all interested in practical entomology, the main facts regarding the life-history, habits and appearance of the Oyster-shell Bark-louse Scale, and of the scales which are often mistaken for it. The damage done by this scale of late years has attracted so much attention, and so many enquiries have been received concerning the best methods for its eradication, that it is hoped earnest efforts will be made at once by all concerned to get it under control.

The Oyster-shell Bark-louse *(Mytilaspis pomorum)* is widely scattered throughout the orchards of Ontario, and the damage done by it is very considerable over the Province and rapidly on the increase.

Although of European origin, it has been known in America for more than a century, and has gradually spread throughout the larger portion of North America.

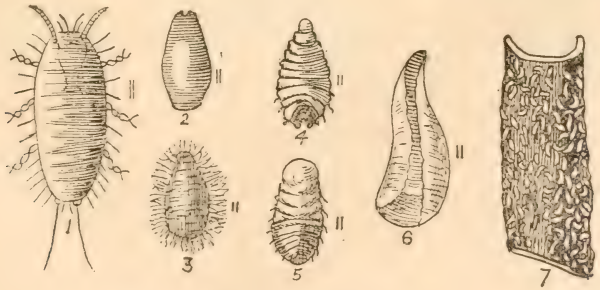

FIG. 30.—The Oyster-shell Bark-louse.

This scale is a very serious pest in orchards which are neglected and badly treated, but experience has shown that with careful treatment it can be readily kept in check. It has been found to occur on the following

trees and shrubs: Apple, plum, pear, wild red cherry, grape, currant, rose, maple, poplar, ash, birch, and various others.

In order to combat this scale, it is first absolutely necessary that one should be well acquainted with its life-history.

Life-history.—This minute insect, found upon the bark of the small twigs and also upon the branches and trunks of the above-mentioned trees, is readily identified by its oyster-shell-shaped scale, about one-sixth of an inch in length. It is of a brown colour, and, thus disguised by the bark, is not seen unless by close observation. Usually a good many are clustered together, and their shape is so marked that orchardmen should soon recognize them. These scales sometimes cover twigs and large branches completely; even the leaves are often infested, and sometimes the fruit itself becomes more or less covered. Last year the fruit on several Maiden's Blush apple trees grown in the orchard of the O. A. C. was noticed to be affected by the scale. This, however, is the exception rather than the rule.

This insect is one-brooded, and winters over in the egg stage. The eggs can be easily seen if at any time in the fall or winter the old scales be lifted up and examined beneath. Numbers of very small whitish-yellow eggs will be seen. Here beneath this oyster-shaped scale they remain until early in the summer. The young yellow lice escape from the eggs during the last week in May and the first week in June; that is, in the vicinity of Guelph. They wander for a few hours, or a few days, on the limb, then settle down and secrete a scale. They fix themselves upon the tender bark, which they pierce with the beak-like structures connected with their mouths, and by means of which they are able to suck the sap from the tree. The larvæ moult, or shed their skins, twice in the course of their growth during the summer. These moults can be readily seen on the narrow end of the large scale. The adult female dies soon after the laying of the eggs, about 60 in number, in the fall. They may be spread from tree to tree to some extent by birds, and also by other insects.

Such is the life-history of the Oyster-shell Bark-louse, and before entering into a discussion as to the best means to adopt for its eradication, it will be as well to briefly mention and describe one or two other species of the commonly-occurring scales which most closely resemble it, and to point out the differences for this purpose cuts are given with the various scales.

The Scurfy Bark-louse (Chionaspis furfurus).—The Scurfy Bark-louse is not so widely distributed through Ontario as the Oyster-shell Bark-louse, and does less damage. It occurs most commonly on pear,

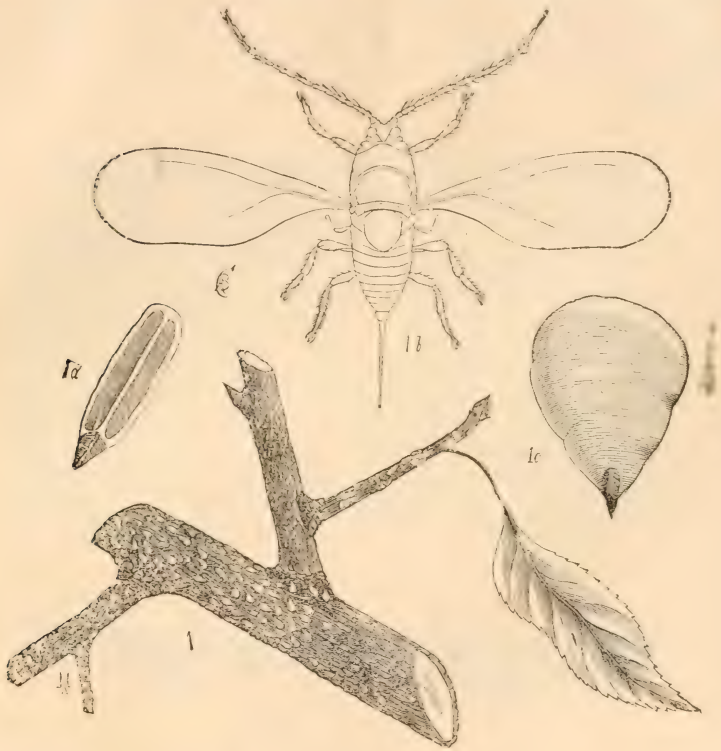

FIG. 31.—The Scurfy Bark-louse.

apple, gooseberry and black currant. This scale resembles the Oyster-shell Bark-louse closely in shape and size, the main points in which they differ being in the colour of the eggs and in the adult scale.

The eggs of the Scurfy Bark-louse are of a purplish colour, whilst those of the Oyster-shell are a whitish-yellow. The adult scale of the Scurfy Scale is also white in colour. The female scale is much larger and more oval than the male scale.

The same remedies may be employed against the Scurfy Bark-louse as are advised in this article as being most suitable for the Oyster-shell Bark-louse.

San José Scale (Aspidiotus perniciosus).—The San José Scale is readily distinguished by the characteristic shape of the female scales. They are round and nearly white, with generally a clearly-defined central nipple. After the first moult the scales become almost black, with a conspicuous depressed ring around the nipple. The adult male scale is oblong in outline, with the nipple near one end, and is much smaller than the female.

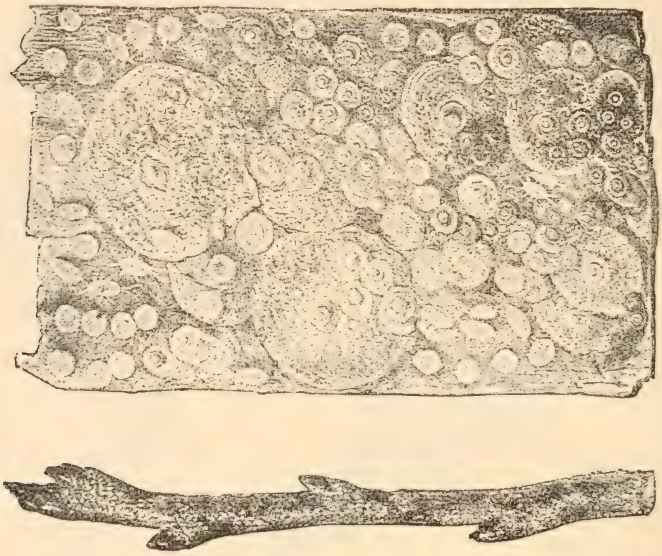

FIG. 32.—San José Scale.

The following points will clearly separate the San José Scale from the Oyster-shell Bark-louse and the Scurfy Scale :

First : The arrangement or grouping of San José Scales on the bark is generally characteristic, and is often sufficient to at once identify them. They seldom have a tendency to cluster, if there be few in number, but, instead, are scattered somewhat evenly on the bark.

On badly-infested trees the presence of the scale on new growths and the fruit produces a deep-red coloration on the tissues of the bark.

It leaves no conspicuous, ventral, whitish scale on the bark after the removal of the insect, as does the Scurfy Bark-louse.

The reason for considerably more damage being done by the San José Scale than by the Oyster-shell Bark-louse is on account of the San José Scale producing many broods in one season, and also bringing forth its young alive, whereas the Oyster-Shell Bark-louse is one-brooded and winters over in the egg stage.

The treatment to be adopted for nearly all the scales is practically the same in all cases. On deciduous trees, where the scales remain during the winter upon trunks and branches, and where the trees become dormant, the scales are best treated during the winter. At that time there is no foliage to interfere, and much stronger washes can be used than would be possible during the summer, or when the tree is active. It is extremely difficult to penetrate insect tissues with ordinary liquids, and it has been found impossible in practice to obtain good results in the destruction of scale insects, except by means of caustics. The common soaps are all caustic, and, when applied in strong solutions, the scale is shrivelled, lifted, and partially corroded, so that the oily mixture works its way beneath into absolute contact with the insect. Or it is raised at the edges and washed off by the rains, carrying with it either eggs or young, as the case may be. In fact, where the eggs hibernate, winter applications act only by exposing them, so that they are easily washed away by rains and scattered.

In the case of plants which do not lose their foliage at any period, or in conservatories, or where winter treatment for any reason is not feasible, we must attack the insects when the larvæ are crawling about, and before they are fixed. At that time, whilst not protected by a scale, they may be easily killed, almost any of the contact insecticides being effective.

Remedies.—Owing to the large number of applicants who were desirous of obtaining information on the best methods of combating the Oyster-shell Bark-louse, it was decided to carry on a number of experiments here, to test the efficiency of the various insecticides commonly used against scale insects.

Of all the spray mixtures tried, the well-known lime, salt and sulphur wash gave the best results.

The lime, sulphur and caustic soda, and the lime, sulphur and sal soda were also tried, but without quite such good results. The lime, sulphur and caustic soda proved to be a little superior to the lime, sulphur and sal soda, owing to its apparent power of better penetration.

Soaps.—Various soaps were also tried, and of these the Whale-oil Soap Emulsion gave the best results, many of the scales being killed.

The Whale-oil Soap gave good results also, but not equal to the Emulsion.

Sunlight and Lifebuoy soaps, and also a mixture of both, proved to be of very little value, inasmuch as they did not prevent the eggs from hatching. These soaps are claimed by the makers to be most effective against the San José and other scale insects, but applied as a winter wash against the Bark-louse they have little value. Undoubtedly they should be applied after the young lice hatch, and not as a winter application, and then would most likely prove effective against the tender lice.

Kerosene Emulsion.—Kerosene Emulsion was also tried, and this proved of more value than the Whale-oil Soap Emulsion, but not so effective as the lime, salt and sulphur wash.

Lime.—Quick slaked lime, 1½ lbs. to 1 gallon of water, proved very effective applied as a winter wash, and equalled the results obtained by the lime, salt and sulphur.

Kerosene-Lime.—This was also tried, but did not prove superior to the Kerosene Emulsion, and therefore is not to be preferred to it.

A NEW CRYPTINE GENUS FROM CUBA.

BY WILLIAM H. ASHMEAD, M.A., D.SC., WASHINGTON, D. C.

Some years ago Mr. J. M. Espin, of Guantanamo, Cuba, sent to Dr. L. O. Howard for names some parasitic Hymenoptera, among which I indicated a new genus, but which I neglected to describe. As Mr. Espin has recently written about it and desires its early description, I submit the following :

Nesolinoceras, new genus.

Resembles *Linoceras*, Taschenberg, in the shape of the abdominal petiole, which is straight or nearly, not elbowed, and only slightly thickened at apex. It also resembles somewhat *Joppidium*, Walsh. In my Classification of the Ichneumon Flies, 1900, p. 40, it will fall in next to Walsh's genus on account of the metathoracic characters and the transverse median nervure in the hind wings being broken *above* the middle.

The two, however, may be easily separated by the following differences :

Metathorax rounded off posteriorly, punctate, with only one transverse carina—the basal, the spiracles rather large, elongate oval.

Submedian cell in front wings a little *longer* than the median, the areolet large, pentagonal, the sides parallel; wings black, brown or fuscous.....*Joppidium*, Walsh.

Submedian cell in front wings a little *shorter* than the median, the areolet not large, irregularly pentagonal, the sides strongly convergent above; wings hyaline, with transverse brown fasciæ.....*Nesolinoceras*, n. g.

(Type *N. Espini*, Ashm.)

Nesolinoceras Espini, n. sp.

♂.—Length, 11 mm. Red, marked as follows: The clypeus and the face, the upper front orbits to summit of the eyes, the hind orbits and cheeks to base of mandibles, a spot at base of mandibles, the front coxæ and their first joint of trochanters, the front margin of the prothorax and the hind margin on each side to the tegulæ, the inner margin of the tegulæ, a large rounded spot beneath tegulæ, a large triangular spot beneath the insertion of the hind wings, a large but obscure spot on the mesopleura posteriorly below it, most of the middle coxæ, a transverse band across disk of scutellum, a spot on the hind coxæ at base above, a streak on the scape beneath, and the extreme apices of dorsal abdominal segments 3, 4, 5 and 6, but very narrowly, all white; the flagellum, the depression of the prothorax laterally, the tegulæ, except as noted, a streak surrounding the posterior white spot on the mesopleura, and the scutellum, except the transverse white band, are black or blackish; wings hyaline, with three transverse fuscous fasciæ, *i. e.*, one across from the middle of the basal nervure, another from the stigma, and the third at the apex of the wing, becoming more or less confluent with the second on the hind margin; the hind wings are wholly hyaline; the stigma and most of the veins in both wings are black, but there is a streak across at base of the stigma, a bulla near apex of the first recurrent nervure, another at apex of the first transverse cubitus, and most of the second transverse cubitus and the second recurrent, except at base and apex, are white.

Type.—Cat. No. 9958, U. S. N. M.

Guantanamo, Cuba.

This interesting species is dedicated to Mr. J. M. Espin, who captured it July 26, 1901.

ANOPHELES CRUCIANS, WIEDMANN.

BY C. S. LUDLOW.

Laboratory of the Office of the Surgeon-General, U. S. Army, Washington, D. C.

A curious little error has crept into the description of this mosquito, and has been carried into so many authors that it seems as if the easiest way would be for the insect to rearrange its markings.

Wiedmann, in his description (Ansse Europ. Zweifleg, Ins., p. 12, 1828) says: "Taster bräunlich schwarz, glieder an der Wurzel wenig shneeweiss," but this is, of course, a broad generalization, and the words are used loosely.

Coquillett (Circ. 40, 2nd series, Dept. Agri., p. 4, 1899) makes the statement more definite: "palpi marked with white at the bases of last four joints."

Theobald, quoting this, makes it part of his description. (Mon. Cul. of the World, Vol. I, p. 204, 1901.)

Blanchard (Les Moustiques, Hist. Nat. et Med., p. 171, 1905), apparently using the same information, says: "Palpes d' un noir brunâtre, marques de blanc à la base des 4 dernier articles."

Felt (Mos. or Cul. of N. Y. State, N. Y. State Museum, p. 270, 1904) also carries on the error, giving as one of the distinctive characteristics, "the white bases of the last four segments of the palpi."

Smith, in his synoptical table (Report on Mosquitoes, N. J. Agri. Expt. Sta., p. 152, 1904), makes the "palpi white-marked at base of joints," but figures and describes the palpi correctly (id., p. 170).

Coquillett, in his last work on the subject (a Classification of the Mosquitoes of North and Middle America, p. 12, 1906), drops this characteristic, but does not correct his former error.

In reality, the specimens sent in to this office, for more than a year, from various parts of the U. S., and those in the collection of the National Museum show the last joint of the palpi entirely white (silvery-gray) and very narrow white bands at the bases of the penultimate and antepenultimate joints, sometimes involving slightly both sides of the joints, the remainder of the palpi being entirely brown. The only variation on this is that in some rubbed specimens the base of the ultimate joint appears *brownish*, but the perfect specimens show the entire distal joint and *two* bands white.

September, 1906

SYNOPSIS OF BEES OF OREGON, WASHINGTON, BRITISH COLUMBIA AND VANCOUVER.—V.

BY HENRY L. VIERECK, ASSISTED BY T. D. A. COCKERELL, E. S. G. TITUS, J. C. CRAWFORD AND M. H. SWENK.

This portion of the synopsis was kindly prepared by Mr. J. C. Crawford, and is based on material, in the main, from Dr. Cordley, of Corvallis, Oregon; Prof. Harvey, of Victoria, British Columbia, and Mr. Venables, of Vernon, B. C. A species from Montana is also described.

Halictidæ, HALICTUS, Latr.

BY J. C. CRAWFORD, DALLAS, TEXAS.

Females.

1. Having no green ..... 2.
   Having more or less green ..... 17.
2. Cheeks armed ..... *ligatus*, Say.
   Cheeks not armed ..... 3.
3. Tegulæ large, punctured all over ..... 4.
   Tegulæ normal in size; not punctured all over ..... 5.
4. Mesothorax closely, coarsely punctured; metathorax coarsely rugose ..... *Kincaidii*, Ckll.
   Mesothorax finely, sparsely punctured; metathorax finely rugose ..... *Vachali*, n. sp.
5. Species having well-marked hair bands on the apical margins of abdominal segments ..... 6.
   Species without such hair bands ..... 7.
6. Larger, 10–14 mm., bands very broad, cream-coloured ..... *farinosus*, Sm.
   Smaller, about 10 mm. or less, bands narrow, white ..... *Lerouxii*, Lep.
7. Truncation of metathorax entirely surrounded by a salient rim ..... 8.
   Salient rim of metathoracic truncation lacking at least above ..... 15.
8. Base of metathorax with coarse, deep rugæ ..... 9.
   Base of metathorax with fine striæ ..... 12.
9. Striæ of base of metathorax regular parallel, 1st abdominal segment distinctly punctured ..... 10.
   Striæ irregular ..... 11.
10. A band on middle of 1st segment, bands on bases of segments 2–4, complete ..... *sisymbrii*, Ckll.
    No band on segment 1; bands on 2–4 narrowed or interrupted medially ..... *Olympiæ*, Ckll

11. Base of metathorax with distinct, semilunar enclosure; punctures of mesothorax crowded anteriorly ..... *pacificus*, Ckll.
Enclosure indistinct, punctures of mesothorax not crowded ..... *truncatus*, Robt.

12. Abdomen with basal hair patches or bands; size larger, 7½–8 mm. 13.
Whole surface of abdomen covered with pubescence; size smaller, 6–7 mm ..... 14.

13. Length, 7½ mm.; segments 2 and 3 with only basal hair patches; teeth of hind inner spur very oblique ..... *occultus*, Vach.
Bands on basal segments complete; teeth of hind inner spur not oblique ..... *Cooleyi*, n. sp.

14. Facial quadrangle about square, apical margins of abdominal segments testaceous ..... *Cordleyi*, n. sp.
Facial quadrangle longer than broad, apical margins of segments not testaceous ..... *fartus*, Vach.

15. Apical margins of segments not testaceous ..... 16.
Apical margins of segments more or less testaceous .. *diatretus*, Vach.

16. Thorax almost impunctate ..... *Titusi*, Cwfd.
Thorax closely punctured ..... *trizonatus*, Cress.

17. Bands on apical margins of abdominal segments .. *Provancheri*, D. T.
No bands on apical margins of abdominal segments ..... 18.

18. Punctures of mesothorax coarse ..... 19.
Punctures of mesothorax fine ..... 20.

19. Truncation of metathorax surrounded by a salient rim; wings dusky ..... *Cressonii*, Robt.
Truncation of metathorax not with a salient rim; wings white .. .. *albipennis*, Robt.

20. Abdomen green, apical margins broadly testaceous .... *zephyrus*, Sm.
Abdomen not green ..... 21.

21. Head and thorax blue, tinged green, abdomen black, not pubescent ..... *atriventris*, n. sp.
Head and thorax brassy-green, abdomen pubescent .. *versatus*, Robt.

Males.

1. Species without any green ..... 2.
Species with more or less green ..... 14.

2. Face and legs entirely dark ..... 3.
   Face and legs not entirely dark ..... 5.
3. Smaller, about 6 mm. long ..... *diatretus*, Vach.
   Larger, about 8 mm. long ..... 4.
4. First abdominal segment closely punctured, rugæ of metathorax irregular ..... *sisymbrii*, Ckll.
   First segment sparsely punctured, rugæ of metathorax regular parallel ..... *Olympiæ*, Ckll.
5. Species with hair bands on the apical margins of abdominal segments ..... 6.
   Species without such hair bands ..... 8.
6. Flagellum bright ferruginous beneath ..... *ligatus*, Say.
   Flagellum darker beneath ..... 7.
7. Punctures of abdomen close, abdomen shiny ..... *Lerouxii*, Lep.
   Punctures of abdomen sparse, abdomen not shiny ..... *farinosus*, Sm.
8. Tibiæ entirely dark ..... 9.
   Tibiæ not entirely dark ..... 10.
9. First abdominal segment almost impunctate ..... *Titusi*, Cwfd.
   First abdominal segment closely punctured ..... *trizonatus*, Cress.
10. Base of metathorax with a triangular enclosure ..... *Kincaidii*, Ckll.
    Base of metathorax without such enclosure ..... 11.
11. Base of metathorax with fine striæ ..... 12.
    Base of metathorax with coarse rugæ ..... 13.
12. About 6½ mm., anterior tibiæ yellow, with a black stripe ..... *Cordleyi*, n. sp.
    About 8 mm., anterior tibiæ black, with a yellow stripe. *Cooleyi*, n. sp.
    About 9½ mm ..... *arctous*, Vach.
13. Punctures of mesothorax close, enclosure of metathorax distinct ..... *pacificus*, Ckll.
    Punctures of mesothorax not close, enclosure of metathorax not distinct ..... *truncatus*, Robt.
14. Abdomen with bands on the apical margins of segments ..... *Provancheri*, D. T.
    No bands on the apical margins of segments ..... 15.
15. Abdomen green, with more or less testaceous ..... *zephyrus*, Sm.
    Abdomen not green ..... 16.

16. Mesonotum finely punctured ..... 17.
Mesonotum coarsely punctured ..... 18.
17. Nervures and stigma pale, abdomen brownish ..... *versatus*, Robt.
Nervures and stigma dark, wings dusky, abdomen black ..... *atriventris*, n. sp.
18. Wings, including nervures, whitish ..... *albipennis*, Robt.
Wings and nervures dark ..... *Cressonii*, Robt.

H. ligatus, Say.—Corvallis, Ore., May 29, 1 ♀.

H. Kincaidii, Ckll.—Olympia, Wash. (recorded by Ckll.), Corvallis, Ore., June, August.

H. Vachali, n. sp.—♀. Black, facial quadrangle slightly longer than broad; face, including supraclypeal area, closely punctured, clypeus sparsely so; antennæ reddish beneath; mesothorax dull, finely-roughened, rather sparsely, finely punctured; base of metathorax narrow, finely striatulate, striæ not reaching apex, rest of space, including metapleura, rather coarsely roughened; truncation finely roughened, not surrounded by a salient rim; wings slightly dusky, nervures brown; tegulæ large, punctured all over, dark, with a brownish centre; legs dark, hind inner spur with about five long teeth, abdomen shiny, small lateral hair patches on bases of segments 2 and 3, base of segment 1 sparsely, and bases of remaining segments closely punctured, apical margins almost impunctate and reddish.

Length about 6½ mm.

Corvallis, Ore., June 6, 1898, 1 ♀.

On account of the punctured tegulæ this is related to *Kincaidii*, but is separated by the fine punctures of the mesothorax and the fine striæ of the metathorax.

H. farinosus, Sm.—Synonyms: *H. montanus*, Cwfd.; *Paranomia Venablesi*, Ashm.; *H. proceris* and *H. denticulus*, Vach. Taken at Wawawai, Yakima, Almota, Wash.; Corvallis, Ore., June; Harrisburg, Ore.; Vernon, B. C., May 5, Aug. 17.

H. Lerouxii, Lep.—Corvallis, Ore., June. Many ♀'s showing great variation in size and in the width of the abdominal bands, some having them a mere line. Vernon and Coldstream, B. C.

Var. *ruborum*, Ckll.—Seattle, Wash. (Type.)

H. sisymbrii, Ckll.—Recorded from Olympia, Wash., by Prof. Cockerell.

H. Olympiæ, Ckll.—Described from Olympia, Wash., Corvallis, Ore., May and June. Many ♀'s.

Var. *subangustatus*, Ckll.—Described from Olympia.

H. pacificus, Ckll.—Recorded from Olympia and Seattle, Wash., by Prof. Cockerell.

H. truncatus. Robt.—Prof. Cockerell gives this species as *similis*, Sm., from Olympia, Wash.

H. occultus, Vach.—Described from Wash.

H. Cooleyi, n. sp.—♀. Black, head, thorax and legs clothed with ochraceous pubescence, abdominal segments with basal whitish hair bands, apical margins of segments broadly testaceous. Facial quadrangle about square, head closely punctured, punctures crowded above antennæ, below, the sides of face rugoso-punctate, supraclypeal area very closely punctured, clypeus, except base, sparsely punctured, very shiny; antennæ dark, only very obscurely reddish beneath toward apex; punctures of mesothorax crowded except mediaily, surface finely roughened, shiny; base of metathorax finely striate to apex; truncation surrounded by a cordate salient rim, rather indistinct above and with a few fine striæ; pleura rather coarsely sculptured, especially the metapleura above; wings slightly dusky, the nervures and stigma yellowish; tegulæ dark, with a light centre; legs dark, hind inner spur with about seven teeth; abdomen shiny, segment 1 almost impunctate, bases of other segments finely closely punctured, apical margins more finely and sparsely punctured; hair bands on bases 2–5, the last showing only when the abdomen is distended; discs of segments with a few yellow hairs; pubescence of apical segments yellow.

Length about 8½ mm.

Bozeman, Montana, June 6, 1904.

♂. Similar to ♀, antennæ long, entirely dark, sculpture of metathorax and pleura coarser than in ♀; clypeus anteriorly, labrum and a spot on mandibles, one on tubercles and tegulæ, line on front of anterior tibiæ and bases and apices of all tibiæ and tarsi entirely yellow; punctuation of abdomen coarser and more distinct than in ♀; 1st segment distinctly punctured; apical margins of segments only narrowly testaceous; last ventral segment with a median longitudinal carina.

Length, 7–8 mm.

Missoula, Montana, Aug. 23, 1904.

Paratypes from various localities in Montana and from Corvallis, Ore., April 26–June 17 ; 16 ♀'s.

H. Cordleyi, n. sp.—♀. Length, 6–7 mm. Black, facial quadrangle about square ; face above antennæ closely, strongly and rather finely punctate ; below very shiny black, sparsely, coarsely punctate ; mandibles ferruginous at tips ; head and thorax with abundant long, slightly ochraceous pubescence ; flagellum ferruginous beneath ; mesothorax finely sericeously roughened, finely, closely punctate, much sparser medially ; median and parapsidal grooves apparent ; base of metathorax wide, no distinct disk ; covered with fine vermiform rugæ ; truncation surrounded by a rather indistinct cordate rim ; legs black, tarsi more reddish ; hind inner spur with about four large flattened teeth ; wings hyaline, nervures and stigma honey-colour, second submarginal cell as broad as high ; tegulæ mostly testaceous ; abdomen brownish, apical margins broadly ferruginous ; segments with fine sparse punctures ; segments 2 and 3 with lateral basal following segments covered with dense appressed whitish pubescence ; venter obscurely ferruginous.

7 ♀'s. Corvallis, Ore., May 24, 1898 ; June 17, 1897 ; June 4, 1898 ; July 17, 1896 ; May 20, 1899 ; May 15, 1898 ; April 4, 1897.

Var. *a* appressed pubescence of abdomen almost lacking (worn ?), rugæ of metathorax finer, less numerous. 1 ♀. Corvallis, Ore , May 24, 1898.

Differs from *dasiphoræ* by its subquadrate face ; and from *Foxii* and *quadrimaculatus* in the same manner.

♂. Similar to the ♀ ; antennæ long, reddish beneath, joint four longer than two and three ; clypeus anteriorly, labrum and mandibles, tubercles, tarsi, anterior tibiæ except a blotch medially, and bases and apices of other tibiæ, yellowish ; pubescence of abdomen confined to the basal hair patches ; abdomen finely, rather closely punctured.

Length, nearly 6 mm.

Corvallis, Ore., Aug. 14, 1896.

H. fartus, Vach.—Described from Washington.

H. diatretus, Vach.—Described from Washington. Six specimens from Corvallis, Ore., are very doubtfully referred here.

H. Titus, Cwfd.—Corvallis, Ore., 3 ♂'s, Oct.; 14 ♀'s, May and June.

H. trizonatus, Cress.—2 ♀'s, Corvallis, Ore., June 6. The record of *coriaceus*, Sm., from Olympia, Wash., by Prof. Cockerell, I think is this species, as I have never seen the true *coriaceus* further west than Michigan. *H. egregius*, Vach., would run to this species in the table, and from his description I am unable to separate it, except that he says hind inner spur with six teeth or spines, which is not true of *trizonatus*, it having eight or nine saw-like teeth.

H. Provancheri, D. T.—Synonym: *H. nearcticus*, Vach. Recorded from B. C. by Vachal. All the specimens from Corvallis, Ore., are much smaller and may be distinct, but the ♂ is needed to verify this.

H. Cressonii, Robt.—Corvallis, Ore., May and June, 2 ♀'s.

H. albipennis, Robt.—Corvallis, Ore., May 27, 1 ♀.

H. zephyrus, Sm.—Corvallis, Ore., June 11, Oct. 14, 2 ♀'s.

H. atriventris, n. sp.—♀. Head and thorax dark blue, finely lineolate, slightly shiny, the whole insect covered with sparse, slightly ochraceous pubescence; head above antennæ closely, finely punctured; facial quadrangle about square; mesothorax finely, sparsely punctured, median groove plain, parapsidal grooves subobsolete; base of metathorax finely, irregular rugulose and finely lineolated, the rugæ reaching the apex; wings dusky, nervures and stigma dark testaceous; second submarginal about half as long as third, third narrowed only slightly to marginal; tegulæ piceous, with a dark reddish centre; legs dark, pubescence slightly ochraceous, hind inner spur with about four long teeth; abdomen black with greenish reflections, almost entirely nude, shiny, almost impunctate, the apical margins of the segments dark testaceous.

Length about 6 mm.

Goldstream, B. C., July 27, 1902.

♂. Similar to the ♀; has no light on face or legs, more greenish in colour than the ♀, but the metathorax blue and coarsely rugose; nervures darker, apical margins of the abdominal segments not light.

Length about 6 mm.

Mission, B. C., August 8, 1904.

Apparently close to *semicæruleus*, Ckll., which, however, has hyaline wings, large punctures on the mesothorax, light tegulæ, etc.

In addition to the species listed above, the collection contains a large series of a male from Corvallis, but since the males of most of the western species are yet undescribed, it was thought that this might represent a

species already described. There are also some small green females, but rather poor specimens, so they are not described, although apparently new.

AGAPOSTEMON, Sm.

BY J. C. CRAWFORD, DALLAS, TEXAS.

1. Females ..... 2.
   Males ..... 6.
2. Abdomen black, with hair bands on the bases of segments two to four ..... *viridulus*, Fabr.
3. Mesothorax with fine punctures and interspersed large punctures ... 4.
   Mesothorax not with double punctuation ..... 5.
4. Base of metathorax with indications of a triangular enclosure ..... *Texanus subtilior*, Ckll.
   No enclosure as above, size large, about 12 mm ..... *borealis*, Cwfd.
5. Larger, blue-green, mesothorax rugoso-punctate ..... *femoratus*, Cwfd.
   Smaller, golden-green, punctures of mesothorax distinct. *radiatus*, Say.
6. Hind femora almost globose ..... *femoratus*, Cwfd.
   Hind femora not greatly swollen ..... 7.
7. Last ventral segment with a median longitudinal carina ..... *viridulus*, Fabr.
   No carina on last ventral ..... 8.
8. Abdomen with six yellow bands, pubescence on apical segments dark ..... *radiatus*, Say.
   Abdomen with five yellow bands, pubescence on apical segments light ..... sp.

A. viridulus, Fabr.—Corvallis, Ore. Three ♀'s May and June; 3 ♂'s Sept. and Oct.; Fossil, Ore., Sept., one ♂.

A. radiatus, Say.—Recorded by Prof. Cockerell from Pasco, Wash.

A. femoratus, Cwfd.—Type material from Washington. One ♀ labelled W. T.; 2 ♂'s, Mt. Hood, Ore.; W. T.

A. borealis, Cwfd.—Type from Vancouver.

A. Texanus subtilior, Ckll.—A series from Corvallis collected during May and June, varying from the typical form to that of *Texanus* and to specimens large enough for *borealis*. The ♂ recorded as sp. is probably the ♂ of this species, but further collections are needed to determine their status. From this material it would appear that the males can be easily separated, while the females are much more difficult.

THE AMERICAN SPECIES OF PRIOPHORUS.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

There have been described thus far three species of this genus from the United States, two of them known only in the male sex, the third known only in the female sex. A fourth species, known only in the female sex, is described below. The types of *æqualis*, Nort., and *simplicicornis*, Cress., are in the collections of the American Entomological Society, and I am indebted to Mr. J. Chester Bradley for examining these types and furnishing me with the notes on which the descriptions given below are based. The species can be separated by means of the following table :

A. Frontal crest large and prominent, extending laterally to the eyes ; the free part of Sc_1 almost entirely atrophied ....*simplicicornis*, Cress.

AA. Frontal crest wanting or variously developed, never extending laterally to the eyes ; the entire free part of Sc_1 always distinct.

B. Colour resinous, with notal portions black ; frontal crest wanting ; transverse groove caudad of the ocelli distinct ..... *acericaulis*, n. sp.

BB. Colour black, with the apical half of the legs paler ; frontal crest distinct or subdistinct.

C. Frontal crest broken by the antennal fovea ; sides of the ocellar basin scarcely indicated ; transverse groove caudad of the ocelli distinct ..... *æqualis*, Nort.

CC. Frontal crest entire, not broken by the antennal fovea ; sides of the ocellar basin clearly distinguishable ; transverse groove caudad of the ocelli scarcely indicated ..... *solitaris*, Dyar.

Priophorus simplicicornis, Cress.—♂. Long, robust ; clypeus transverse, somewhat elongate, deeply emarginate, pitted ; tentorial invagination deep, extending as a groove along the lateral margin of the antennæ to about the middle of the front, where it is interrupted by the frontal crest, continued as a short groove behind the lateral ocelli, transverse groove indistinct, evident behind the anterior ocellus : antennal fovea triangular, flat, pointed in front ; antennal area almost linear ; frontal crest large and prominent, extending to the eyes ; the sides of the ocellar basin with a distinct rim ; antennæ elongate, tapering to the apex, not enlarged in the middle, segments stout and rough, of the same form as in *solitaris* ;

free part of Sc_1 almost atrophied, a mere trace of a stump on one side, its own length or slightly more proximad of the medio-cubital cross-vein; stigma short and rather broad; cell R_5 a little longer than cell R_4; claws small, the outer ray the longest; colour black, except the legs beyond the knees, varying from semiresinous to brown; wings with the basal half clouded.

Length, 6 mm.

Habitat.—Maine.

Priophorus acericaulis, n. sp.—♀. Short, rather robust; clypeus broad, without setæ, broadly and shallowly emarginate, with the lateral angles rounded; tentorial invagination deep, abrupt on the clypeal side, extending as a deep groove along the lateral margin of the antennæ to the lateral ocelli, where it joins a deep, transverse, curving groove, extending along the caudal margin of the ocelli, from the middle of this transverse groove there is a cephalic projecting groove surrounding the anterior ocellus; the antennal fovea shallow, broad and indefinite; ocellar basin and crest entirely wanting; antennæ short, slightly enlarged at middle, the first and second segments subequal in length, the second twice as long as broad, the third segment at least one-third longer than the fourth; the free part of Sc_1 distinctly proximad of the medio-cubital cross-vein; stigma pointed at apex, with the caudal margin almost straight; the cell R_4 longer than the cell R_5; claws large and slender, cleft, the outer ray longest; cerci minute; saw-guides pointed at apex, sides equally, convexly convergent, dagger-shaped; colour resinous, with the following parts black: the antennæ beyond the second segment, the head, except the clypeus, the labrum, the mandibles, the mesonotum, the metanotum, and a spot beneath the wings; wings hyaline.

Length, 4 mm.

Habitat.—New Haven, Connecticut.

Described from numerous females received from Dr. W. E. Britton.

Priophorus æqualis, Nort.—♂. Moderately robust; clypeus transverse, somewhat elongate, deeply emarginate, pitted; tentorial invagination prominent, extending into a large prominent depression surrounding and extending above the antennæ, continued as a prominent groove to the ocelli, with a distinct transverse groove extending along the caudal margin of the ocelli, and projecting cephalad surrounding the anterior ocellus; antennal fovea deeply concave; antennal area long, narrow, pointed at apex; frontal crest indistinct, broken by the antennal fovea; the sides of

the ocellar basin scarcely indicated ; antennæ stout, rather short, covered with a fringe of long setæ, at the base of which are small protuberances, giving the antennæ a roughened appearance ; first segment twice as long as the second, flaring at apex ; the second short, transverse ; the third and fourth subequal ; the free part of Sc_1 about twice its own length proximad of the medio-cubital cross-vein ; stigma short, rather broad ; the radio-medial cross-vein hyaline ; the cells R_4 and R_5 subequal in length ; claws cleft, the outer ray longest ; colour black, except the legs beyond the knees, four hind trochanters, and anterior femora on sides white, apex of posterior tibiæ fuscous.

Length, 6 mm.

Habitat.—Farmington, Conn. (Norton.)

Priophorus solitaris, Dyar.—♀. Long, robust ; clypeus transverse, densely covered with long setæ, deeply and roundly emarginate, with the lateral angles prominent, angulate ; tentorial invagination prominent, expanding into a large, prominent depression surrounding and extending above the base of the antennæ, continuced as a broad concave depression to caudad of the lateral ocelli, not breaking through the occiput, slightly, transversely interrupted midway between antennæ and ocelli, caudad of the ocelli transformed into a deep line-like groove, the transverse groove and the groove of the anterior ocellus hardly indicated ; the antennal fovea large, broad, shield-shaped ; the antennal area long, narrow, pointed at apex ; the frontal crest distinct, not interrupted ; the sides of the ocellar basin indicated ; the antennæ long and slender, narrowed to apex, first segment twice as long as the second, flaring at apex, the second short, transverse, the third and fourth subequal ; the free part of Sc_1 about three times its own length proximad of the medio-cubital cross-vein ; stigma short, blunt, broadly convex on the caudal margin ; the radio-medial cross-vein almost completely hyaline ; the cell R_5 distinctly longer than cell R_4 ; claws cleft, outer ray longest ; cerci minute, inconspicuous ; saw-guides prominently retracted, exposed portion pointed, concave on dorsal and ventral edges before the apex ; colour black, except the legs beyond the knees, which are white, with apices of the tarsi infuscated ; wings infuscated, stigma and veins brownish.

Length, 7 mm.

Habitat.—Described by H. G. Dyar from a female bred from larvæ on *Alnus ;* Franconia, N. H. (Mrs. A. T. Slosson) ; Ithaca, N. Y. (MacGillivray).

TWO NEW SPECIES OF THERIDIIDÆ.

BY CYRUS R. CROSBY, ITHACA, N. Y.

Theonoe stridula, new species.—Male: Length, .78 mm.; cephalothorax, wide .35 mm., long .39 mm. In the following table the measurements are given in millimeters:

LEGS.	I.	II.	III.	IV.
Tar	.24	.22	.2	.24
Met	.18	.16	.14	.17
Tib	.24	.19	.16	.25
Pat	.13	.12	.11	.12
Fem	.36	.3	.25	.34

Cephalothorax short and moderately elevated, sides arcuate, slightly narrowed in front, dull grayish-yellow, eyes surrounded by narrow black rings; posterior eyes in a slightly recurved line, equal, the median separated from each other by one and one-half times their diameter, and from the lateral by one-half their diameter; anterior eyes in a very slightly procurved line, subcontiguous, the median smaller than the lateral; median ocular area wider behind than in front and wider than long. Clypeus protruding, slightly convex and slightly wider than the ocular area. Cheliceræ longer than the clypeus and paler than the rest of the cephalothorax. Sternum strongly convex and nearly circular, widely separating the posterior coxæ, dull yellowish-brown, bordered on the sides and behind with dark gray, sparsely and evenly clothed with small erect hairs, labium and endites lighter in colour. Abdomen dark gray, in life probably nearly black, beneath the same colour, except the strongly developed epigastric sclerite, which is grayish-yellow. Stridulating organ present as two short broad teeth on the front of the abdomen, just above the pedicle, which are opposed by striated areas on the posterior part of the cephalothorax. Legs yellowish, patellæ much lighter. The so-called auditory hairs are arranged as follows: On the first and second pairs of legs, two near the base of tibia, one on the basal half of metatarsus and one on basal third of tarsus; on the third pair, three near the base of tibia, none on metatarsus, one on basal fourth of tarsus; on the fourth pair, three on tibia, one at middle and two on basal half, none on metatarsus, one on basal fourth of tarsus. Palpus with the femur rather long, curved slightly inward, patella short and curved, tibia a little longer and prolonged on the upper outer side, so that the bulb is contained in the angle between it and the tarsus.

One specimen collected November 20, 1904, on the south bank of Hinkson Creek, Columbia, Missouri. Type in the Cornell University collection.

FIG. 33.—*Theonoe stridula*, n. sp. Male palpus.

FIG. 34.—*Theonoe stridula*, n. sp. Male palpus.

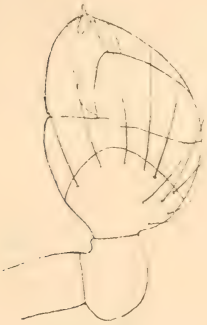

FIG. 35.—*Histagonia Marxi*, n. sp. Male palpus.

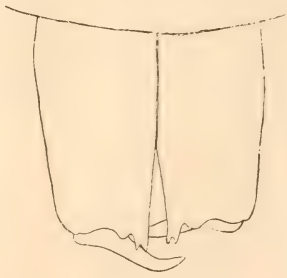

FIG. 36.—*Histagonia Marxi*, n. sp. Cheliceræ.

Histagonia Marxi, new species.—Male: Length, 1.1 mm.; cephalothorax, wide .43 mm., long .52 mm. Cephalothorax a short oval, narrowed in front, strongly elevated and protuberant in the eye region, brownish-yellow. Posterior eyes in a moderately recurved line, about equidistant and with the median eyes a little smaller than the lateral; anterior eyes in a procurved line, equidistant and with the median the smaller. Clypeus concave. Cheliceræ nearly parallel, upper margin of the furrow provided with an angular projection, bidentate at the tip and preceded by an obtuse lobe, lower margin unarmed. Sternum wider than long, rounded at the sides and widely separating the posterior coxæ

behind. Endites slender and inclined towards each other. Abdominal sclerites well developed, the dorsal one covering nearly the whole upper surface, the antemammillary sclerite in the form of a ring surrounding the spinnerets, epigastric sclerite very large, completely surrounding the pedicle as a broad plate. Legs yellowish-brown, the patellæ much lighter, anterior femora enlarged and armed below with a series of eight or nine strong spines. Palpus with the femur rather long and slender, patella short and rounded, tibia short, prolonged on the outer side, and bearing near the margin a row of long hairs.

Female: Much like the male in colour, but lacking the dorsal abdominal sclerite. The cephalothorax is not so strongly prominent in the eye region, the anterior eyes not being borne on a protuberance are therefore much closer together. Anterior femora neither enlarged nor armed with a series of spines. The epigynum consists of a large convex sclerite, the posterior margin of which is raised into a thin transverse, nearly vertical plate, which bears a very small obtuse tooth at the middle. The ducts are united just in front of the opening, which is small, round, and situated on the inner side of the plate near its posterior margin.

The proportions of the segments of the legs are shown in the following table:

LEGS.	I.	II.	III.	IV.	PALPUS.
		MALE.			
Tar.....	.24	.21	.18	.21	..
Met.....	.28	.21	.18	.23	..
Tib.....	.28	.23	.18	.25	..
Pat.....	.17	.15	.13	.14	..
Fem	.47	.37	.3	.4	..
		FEMALE.			
Tar.....	.26	.24	.21	.23	.19
Met	.29	.23	.17	.24	..
Tib.....	.31	.25	.19	.26	.09
Pat.....	.17	.16	.14	.17	.07
Fem	.5	.43	.22	.48	.14

Beersheba, Tennesee and District of Columbia, contained in a collection purchased by Cornell University from William Fox, and bearing the label "*Ceratinella unimaculata*, Marx, MS." Type in the Cornell University collection.

FOUR NEW CULICIDÆ FROM JAMAICA, WEST INDIES.

BY M. GRABHAM, KINGSTON, JAMAICA.

The larvæ of the four species described below were collected, with a large number of others, from temporary pools which form on the plains around this city after the seasonal rains. The different species were separated into breeding bottles, and specimens of the larval skin casts and of the larvæ themselves, when abundant, were preserved for study.

Janthinosoma echinata, nov. sp.— ♀. Head covered with flat spindle-shaped yellow scales, mingled with black hairs, a few long yellow hairs projecting between the eyes, many upright forked scales at the back. Eyes with deep purple reflections, bordered posteriorly with silvery-white scales. Antennæ brown, basal segment deep brown, second slightly inflated, with a few short black hairs. Proboscis black, with violet reflections, speckled with yellow scales. Palpi densely covered with black and yellow scales, the latter predominating in two basal joints. Clypeus black. Prothoracic lobes with a few golden scales and black hairs. Mesothorax black, with spindle-shaped golden scales scattered over its surface, two denser clusters of these scales on the front margin adjoining the prothoracic lobes, also at the posterior margin between the lateral and mid bare spaces. Two narrow median bare lines running over three-quarters length of the mesothorax, broadening as they approach its anterior margin; a median and two lateral bare areas at the posterior margin. A row of long black hairs above the wing insertions; a number of short black hairs distributed in no definite order over the mesothorax. Scutellum black, clusters of golden scales on the mid and lateral lobes; six to eight black hairs spring from the posterior margin of the mid lobe, and three to four from each of the lateral lobes. Pleura with patches of silvery-white scales. Metanotum deep brown. Abdomen black, with violet reflections, basal segment with long white hairs, apex of each segment bordered with a few long white hairs. Lateral apical patches of white scales in the posterior segments. Venter yellow, densely covered with broad yellow scales, among which are interspersed a few violet scales, especially near the bases of the segments. Legs dark metallic violet, with well-marked knee spots on all the femora. Tibiæ,

FIG. 37.—*Janthinosoma echinata*, n. sp. — *a*, *b*, upper and lower pecten teeth; *c*, a few spines from dorsal patch.

metatarsi and tarsi of the hind legs densely scaled. Third and fourth tarsi of the hind legs white scaled. All the ungues uniserrate and equal. Wings, first submarginal longer and narrower than the second posterior, its stems less than half its length. Stem of the second posterior cell a little shorter than the cell. Posterior cross vein more than its own length behind the mid cross vein. Halteres with pale stems and knobs. Length, 5.5 mm.

♂.—Antennæ pale brown, second joint slightly inflated, thickly clothed with a number of long-stalked black scales, with fan-like heads, and long black hairs. Proboscis black, with a faint band on its lower third. Palpi longer than the proboscis by the two terminal joints. Two terminal joints inflated and densely black-scaled, a number of long black hairs along the under surface, a few black hairs on the apex of the terminal joint. Antepenultimate joint inflated at the apex, a few black hairs on the under surface near the apex. A single narrow band of golden scales on its lower third. Terminal segment of the clasp greatly dilated in the middle. Harpes, limb extending into a thin lamina at the apex, from the internal border of which a number of long thin flattened hairs arise; at the tip two convoluted processes are attached. Harpagones with strong recurved tips and two stout thorn-like tubercles on their convex surfaces. Unci deeply chitinized adherent along their internal borders. Setaceous lobes absent. Ungues of the fore and mid tarsi unequal, the larger with two teeth, a long blunt one and a small basal one; the smaller with a minute basal tooth. Ungues of the hind tarsi uniserrate and equal. Length, 5.5 mm.

The following points were noted in the adult LARVA: Fully grown adult larva nearly 5/16 inch long. Antennæ large and prominent, longer than the head, strongly curved about the middle, deeply fuscous except at the base. Slightly inflated in the lower half. Tuft at the middle of about six fine feathered hairs not exceeding half the antennal shaft in length. Apex with three or four short spines. Surface covered with stout chitinous spines. Mentum deeply infuscated, somewhat narrowly triangular; teeth dark and numerous; apical tooth large and prominent. Both upper and lower epistomal hairs are double and feathered, extending beyond the margin of the head. Anteantennal tuft of 8–10 feathered divisions. Body glabrous except for a few small scattered dendritic hairs. A small dorsal patch of minute thorn-like spines, arranged in curved lines, on each segment from the second to the seventh. Lateral

hairs of the abdomen paired and flattened; on the anterior segments each hair is large and 4- to 7-branched, hairs becoming smaller and with fewer branches on the hinder segments. Comb of six or seven scales in a curved row, the largest in the middle. Central scales joined by a thin broad chitinous band, the upper and lower scales separate, base of each scale oval, sides coarsely setose below, the apical free border with one curved stout central spine and two to six much shorter lateral spines. Air tube fusiform, inflated, deeply infuscated, devoid of hairs, about four times as long as wide (at the base); pecten rows of four well-separated teeth in each, a fifth small pair at the extreme base in some specimens; rows one-quarter length of tube; upper two pairs of teeth with two or three smaller denticulations on the inner side, lower pairs with denticulations on both sides. Band ringing the anal segment about as long as broad; barred area running along whole length of the band. Ventral tufts of 18–20 pairs. A pair of tufts and long simple setæ dorsally. Anal gills very long, narrow, pointed, 2½ times as long as the longest hairs of the ventral brush. Pupa with short, stout siphons.

Observations.—Four living larvæ of this handsome species were taken from a temporary pool in a logwood thicket, about 5¾ miles along the Molynes Road, near Kingston, early in April, 1906. The larva is large and stout, the head, which is much compressed antero-posteriorly, is set at right angles to the thorax, and the large antennæ are carried almost vertically downwards, giving the larva a peculiar appearance. The description of the larva is drawn up from the larval skin casts, that of the adult head, thorax and abdomen from the freshly-killed specimens. A notable feature in the male is the thickly-scaled second antennal joint.

Aedes auratus, nov. sp.—♀. Head covered with narrow curved yellow scales and hairs. Many forked upright yellow scales at the back; a few forked upright black scales and black hairs at the sides. Antennæ dark brown, joints with pale yellow hairs. Palpi black, speckled with yellow scales. Proboscis black, with scattered yellow scales and hairs, especially near the base. Clypeus black. Thorax rich golden yellow. Prothoracic lobes with black hairs and yellow scales. Mesothorax densely covered with narrow curved golden-yellow scales in front, somewhat more scantily at the back (scales of thorax darker in shade than those on the head); on each side in front, near the middle line, there are two small dark spots; there is also a large dark area on each side reaching from the prothoracic lobes to above the wing insertions, and extending

laterally to the margin, and a pair of conspicuous black spots near the middle line on the posterior third. A row of black hairs extends from these spots to the posterior margin of the mesothorax. Scutellum with patches of yellow scales on the mid and lateral lobes. Pleura grayish, with patches of white scales and hairs. Metanotum brown. Abdomen black, with narrow basal bands of golden scales and a row of long white hairs along the posterior margin of each segment; lateral areas of silvery scales on the hinder segments; scattered over the dark scaled areas are a number of lighter scales, which form an ill-defined stripe along the middle of the abdomen. Venter white scaled, small apical areas of black scales on the hinder segments at the sides. Legs black: femora white below through the whole length, except near the apex, where there is a black spot; thickly speckled with white scales above, especially near the base; knee spots small. Tibiæ, metatarsi and tarsi all ventrally white scaled, a few long bristles on the joints, those along the tibiæ longest. Ungues all equal and uniserrate. Wings, veins covered with broad, short, flattened scales, extremities of the upper veins with long narrow ones as well. Upper forked cell narrow and a little longer than the lower. Stem about half its length. Posterior cross vein rather more than its own length distant from the mid cross vein. Halteres with pale stems and knobs. Length, 3.5 mm.

FIG. 38.—*Aedes auratus*, n. sp.—*a*, pecten tooth; *b*, thorn-like spines on abdomen; *c*, ornamentation of thorax.

♂.—Proboscis black, nearly as long as the palpi, with scattered yellow scales, especially near the base, apex slightly swollen, tip light brown. Both terminal joints of the palpi somewhat swollen, and covered with many long black hairs, more numerous underneath. Ungues of the fore and mid tarsi very nearly equal, larger with two teeth, smaller with one basal tooth; ungues of the hind tarsi equal and uniserrate. Genitalia closely

resembling those described and figured by Felt (N. Y. State Museum, Bulletin 97), for *Culicada confirmatus*, Theo. The spine at the apex of the terminal clasp segment is about one-fifth length of segment. Claspette obsolete, represented by a few weak setæ and long hairs, one hair much longer than the others, curved at the tip and swollen towards the base. Harpes slender, curved, base without hairs. Harpagones stout, very deeply infuscated, with a recurved sharp point. Setaceous lobes with a few short, stout setæ. Length, 3.5 mm.

Notes on the adult LARVA.—The fully grown larva attained a length of nearly ¼ inch. Head nearly circular, deeply infuscated; antennæ uniformly chitinized, short, stout, subconical, gradually tapering to the apex, straight along the inner surface, outer surface with a constriction at the lower third, giving the antennal shaft a semi-bulbous outline at the base. Apex with four short, stout spines. Tuft below the middle of about six short hairs not reaching to the apex. Lower surface of antenna with a few large isolated chitinous spines, upper surface with several longitudinal lines of small closely-placed spines; these lines extend through nearly the whole length of the antennal shaft; near the base they divide and ramify. The spines vary much in size, and are for the most part directed inwards. Mentum broadly triangular, with about 40 rather small teeth. Upper and lower epistomal hairs single, short; anteantennal hair tuft with about ten divisions. Thorax densely spinous, with short, stout, thorn-like spines; abdominal spines less dense, arranged in ill-defined transverse rows. Lateral hairs paired on the first segment, single on all the other segments. Scales of lateral comb about 15 in a group. Each scale bordered with fine setæ, one or two rather longer terminal spines, the longest of these about half as long as the body of the scale. Air tube about twice as long as broad, a little inflated above the base, deeply infuscated except just at the apex; pecten reaching to the middle, a pair of rather weak hair tufts on a level with the highest pair of pecten teeth; teeth about 15 in number, deeply chitinized, each tooth with several minor teeth on the inner side, one of the latter greatly exceeding the others in size. Anal plate completely encircling the segment, about two-thirds as long as broad; ventral hair tufts about ten pairs springing from a separate barred area; dorsal group of two pairs, upper pair short, compound; lower simple, four times as long as the former. Anal gills equal, lanceolate, narrowing to a fine point, about half as long again as the ventral hair group.

Aedes pertinax, , nov. sp.— ♀. Head with a triangular, yellow area in the centre, made up of yellow hairs and narrow curved scales, some rather broad, flattened ones at the sides, sides and back of the head black, with many upright forked scales and hairs; antennæ dark brown, with silvery hairs on the joints; palpi and proboscis black, speckled with silvery hairs. Clypeus dark brown. Prothoracic lobes black, with many long black hairs. Mesothorax black, sparingly covered with very small narrow curved dark brown scales, a narrow line of brilliant golden scales in the middle line extending to the posterior quarter (in some specimens this line is ill-defined, in others broad and conspicuous), a few long hairs near the posterior border and in front of the wing insertions. Scutellum dark brown, with many long black hairs. Pleura grayish, with patches of silvery scales and hairs. Abdomen, upper surface black, with moderate basal bands of yellow scales, and with large lateral areas of silvery ones, two small circular areas of golden scales in the centre of each segment. A few long white hairs along the apical border of each segment. Venter almost entirely white, with creamy scales, a few black scales near the apical borders of the segments. Wings, extremities of the long veins with long narrow scales and short broad ones, upper forked cell longer, but about as broad as the lower, its stem half its length; the stem of the lower forked cell nearly as long as the cell. The posterior cross vein half its own length behind the mid cross vein. Halteres with pale stems and knobs. Legs black, unbanded, femora and tibiæ with many yellow scales beneath, fewer in the metatarsi and tarsi; knee spots small. Ungues all equal and uniserrate, the tooth large. Length, 4 mm.

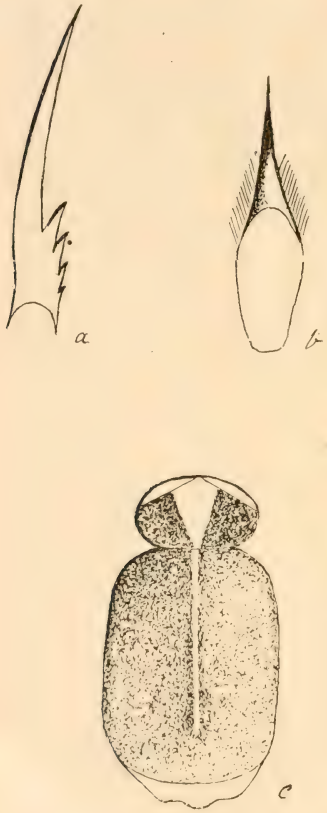

FIG. 39.—*Aedes pertinax*, n. sp.—*a*, pecten tooth; *b*, comb scale; *c*, ornamentation of head and thorax.

♂.—Head, yellow area in the centre more extensive, broad, flat, yellow scales abundant; palpi black, terminal joints slightly inflated, a little longer than the proboscis; both terminal joints and apex of the antepenultimate densely covered with long hairs, some very stout ones at the apices of the joints. Mesothorax with the band of golden scales conspicuous. Terminal clasp segment slender, curved, slightly swollen in the middle, apical spine blunt, about one-fifth length of limb. Basal clasp segment with a large apical lobe; claspette a well-developed lobe near the base, covered with short spines (no long ones present). Harpes, bases villous with fine hairs, at the apex of each a recurved sickle-like portion. Harpagones deeply infuscated, with a strong recurved spine on each. Unci membranous, separated, each terminating in a point. Setaceous lobes pyramidal, with about ten strong carved spines along the internal borders only. Ungues of the fore and mid legs unequal, the larger claw with two teeth, the smaller with one. Ungues of the hind legs equal and uniserrate. Length, 4 mm.

Notes on the adult LARVA.—Head broadly elliptical, long diameter transverse, deeply infuscated. Antenna subcylindrical, with a slight curve inwards, infuscated uniformly. Apex with four short spines, one much longer than the others. Surface with scattered large chitinous spines; the upper surface has in addition several longitudinal rows of minute spines running the whole length of the shaft, the points of these spines directed inwards. Tuft below the middle of about eight short hairs not reaching to the apex of the shaft. Upper and lower epistomal hairs single, a small compound hair on the inner side of these, anteantennal hair tuft of 7–8 divisions. Mentum triangular, with about 30 small teeth. Thorax and abdomen sparingly covered with fine setæ. Two large hairs on each side of the first abdominal segment, a single large one on all the others. Comb of about ten scales in a single curved row, each scale with a strong apical spine and a number of fine setæ on each side, spine as long as the body of the scale. Air tube 2x1, deeply chitinized except just below the apex, subconical, slightly swollen above the base. Rows of pecten teeth insertions reaching up half the tube. Teeth evenly spaced, about twelve in number, each with several small denticles on the inner side; these are progressively smaller from above downwards. A pair of large compound hairs at the level of the upper pair of teeth. Band ringing anal segment about two-thirds as long as broad; ventral group of hair tufts (about ten pairs) from a separate barred area; dorsal group composed of a pair of compound and simple hairs. Anal gills unequal,

tapering; ventral pair a little longer than the longest ventral hairs, dorsal pair one-third as long again as the ventral pair.

Observations.—The larva of this species superficially closely resembles the foregoing, and still more those of *A. hemisurus*, Dyar and Knab. The last named has no rows of spines on the antenna, the comb scales are without spines, having only setæ, and the compound hairs in the tube are above the pecten rows. According to Dyar and Knab's table and figure (from N. Y. Ent. Soc., Vol. XIV), it would seem to be near *A. tormentor*, D. & K., a mainland species.

Mochlostyrax Jamaicensis, nov. sp.—♀. Head with pale yellow flattened scales at the middle and sides, many long black forked scales at the back, each of these irregularly frayed along the upper expanded border. Some long black hairs among the other scales. Proboscis black, swollen at the apex, speckled with yellow scales, tip yellow. Palpi black, the terminal joints yellow scaled. Eyes with white borders posteriorly. Clypeus dark brown. Antenna dark brown, joints with scattered brown hairs, these are rather larger and arranged in a ring below each clear area, suggesting a double set of verticellate hairs. Prothoracic lobes black, somewhat prominent, covered with fine scales and long black hairs. Mesothorax black, with two dark brown median bands anteriorly. Surface covered with fine hair-like scales, a row of long black hairs on each side of the mid line, another row at the edge near the prothoracic lobes, and a group in front of the insertion of the wing. Scutellum dark brown, with fine scales, six long bristles on the posterior border of the mid lobe, and four on each of the lateral lobes. Metanotum dark brown. Pleura grayish, with a line of black bristles down each side to the mid coxæ, a cluster of bristles anteriorly between the front coxæ, several small patches of white hairs below the insertions of the wings. Abdomen black, and speckled with dull white scales, the latter denser at the bases of the segments, forming a pronounced band at the base of the second segment, long white hairs along the posterior borders of the segments. Small lateral white scaled areas on the sixth and seventh segments formed by the extensions of the white ventral bands. Venter with broad crescentic basal bands of silvery scales. Legs black, ventral surfaces of the femora white, except at the extreme apices, where there are

FIG. 40.—*Mochlostyrax Jamaicensis*, n. sp.—*a*, bar from comb; *b*, hook from tube.

patches of black bristles ; apices of femora and tibiæ swollen. A band of lighter scales running along the under surfaces of all the legs (especially marked on the mid legs) to the tips. A yellow spot at the apex of hind tibiæ. Knee spots not defined. Ungues equal and simple. Wings, the apical portions of the first four long veins densely scaled with broad fan-shaped scales. The two median rows of broad scales are represented by narrow elongated ones on the bases of the second and third, first part of the base of the fourth and upper arm of the fifth. The remainder of the base of the fourth and the lower arm of the fifth have long scales on one side only. The base of the fifth has broad scales only throughout its length. On the sixth long vein the scales are all slender and elongated. First submarginal cell as wide as but much longer than the second posterior, about four times as long as the stem ; second posterior with the stem about half length of the cell. Posterior cross vein about twice its own length distant from the mid cross vein. Halteres with pale stems and knobs, the latter mottled with dark areas. Length, 2.5 mm.

♂.—Palpi black, copiously speckled with yellowish scales, slender, larger than the proboscis, the tip of the latter reaching to the middle of the penultimate joint ; long hairs along the sides and under surfaces of the first two joints and apex of the antepenultimate joint. Both terminal joints and apex of antepenultimate joint slightly swollen. Abdomen black, with scattered dull white scales : these form an ill-defined band down the centre of the abdomen, lateral patches of silvery scales on the fifth, sixth and seventh segments. Legs black, conspicuous lines of lighter scales on the under surfaces of all the legs. Ungues of the fore and mid tarsi unequal and uniserrate ; larger with one long median blunt tooth, smaller with a small basal tooth. Ungues of the hind tarsus equal and simple. Length, 2.5 mm.

The following points were noted in the adult LARVA : Fully grown larva about 1/8 inch long, with relatively large head and thorax. Antennæ large and prominent, larger than the head, slightly curved in lower third, somewhat swollen in the basal half, only moderately infuscated, rather more so above the lateral tuft and at the extreme base. Tuft a little above the middle, of about twelve fine flattened hairs measuring about three-quarters length of the antennal shaft. Apex with four large deeply infuscated spines, the two longest about half the length of shaft. Surface covered with many fine chitinous spines, especially along the outer aspect. Mentum small, with about fifteen teeth, apical tooth prominent. Upper

epistomal hair double or single, lower larger, single, both flattened, neither reaching to the anterior border of head. Anteantennal hair with five or six divisions, flattened. Thorax coarsely pilose along the anterior and lateral aspects. Abdomen finely pilose, more densely at the insertion of the lateral hairs and near the comb. Lateral hairs long, five on each side of the first segment, three on the second, paired on the hinder segments. Comb of 10–12 well-separated bars in a curved row, upper ones smaller, smallest about one-third length of longest. Each scale has a line of fine hairs on each side, most marked on the swollen basal portion. Air tube subconical, with a slight curve forward, about five times as long as broad (at the base). A pair of hooks at the tip, each with a fine curved tooth at the middle. Eight or nine pairs of long hairs along the posterior surface, each with 4–5 divisions; upper shorter, two pairs within the lines of insertion of the pecten teeth. Lines of pecten teeth insertions reach up one-quarter of the tube; teeth about nine pairs, upper very long, tips of the highest approach the middle of the tube, each tooth narrow, flattened, slightly curved, with many fine setæ along its inner border. Two pairs of small compound hairs on each side of the tube, one near the middle, the other within the upper quarter. Band ringing the anal segment about as long as broad. Ventral group of hairs spring from a separate barred area. Dorsal group of two pairs of very long simple, nearly equal, hairs. Anal gills with prominent tracheæ, elongated, narrow, unequal, lower pair longest, half as long again as the ventral hair group. Pupa with rather long, deeply-infuscated siphons.

Observations.—The larvæ of this species, belonging to Dyar and Knab's interesting new genus, *Mochlostyrax*, were collected in the same locality as the preceding. They were placed in a separate jar, with an abundance of Crustacea and Infusoria, and developed rapidly. The usual position of the larva was on its back at the bottom of the jar or hooked up on the sides by its siphon. It apparently never rose to the surface except just before pupating. The adults bear a strong superficial resemblance to the small swamp mosquito, *Melanoconian atratus*, Theo., the venation and form of the wing scales being precisely similar. The description of the adults was drawn up from freshly-killed specimens.

Mailed September 7th, 1906.

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THREE NEW CANADIAN FLEAS.

BY THE HON. N. CHARLES ROTHSCHILD, M.A., F.L.S., TRING, HERTS, ENG.

1. Chætopsylla setosus, sp. nov.—Nearest to *Ch. ursi*, Rothsch. (1902), but easily recognized by the shape of the abdominal sclerites and the tarsi.

Head.—The labial palpus consists of about ten segments, reaching beyond the trochanter, while in *ursi* there are seven or eight segments only. There is one row of four or five bristles before the eye. The occiput bears two or three hairs behind the base of the antenna, a lateral row of four or five bristles in the centre, and a subapical row.

Thorax.—There is one row of bristles on the pronotum, besides one or two hairs situated on the back. The epimerum of the metathorax is strongly produced backwards, rather more so than in *Ch. trichosa*, Koh. (1903), and bears a posterior row of from six to nine bristles, besides about ten smaller ones, which are arranged in two irregular rows.

Abdomen.—The tergites of the first seven segments bear each two rows of bristles, there being some additional hairs in front of these rows on the first three tergites. The anterior row is incomplete on the posterior tergites. On the second tergite there are about eight, on the third about six bristles placed beneath the stigma, while there are in this position two bristles on segments four to seven, the last bristle of the postmedian row being likewise situated below the stigma (Fig. 41).

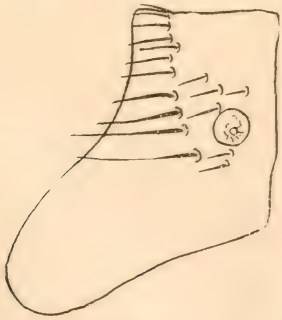

FIG. 41.

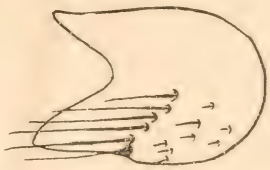

FIG. 42.

The first sternite has some lateral bristles, while the sternites of segments three to seven bear each a row of three or four bristles, and from

seven to ten smaller ones. All the dorsal and ventral sclerites of segments one to seven are small and (in extended specimens only?) widely separated. The hinder edge of the sternites is slanting, the upper hinder angle projecting backwards. The seventh sternite is sinuate (Fig. 42).

Legs.—The arrangement of the bristles is of the type usually found in this genus. The hind tibia bears six dorsal pairs of bristles. One of the apical bristles of the second hind tarsal segment reaches to the middle of the fifth segment, while the longest apical bristle of the fourth hind tarsal segment extends nearly to the claw. The bristles on the ventral surface of the mid and hind tarsi are numerous. The fifth segment is as slender as in *Ch. trichosa*, being much slenderer than in *Ch. ursi*. It bears ventrally a subbasal hair. The proportional length of the tarsal segments is as follows:

Mid tarsus	25	23	16	12	28	
Hind tarsus.....	46	28	18	14	28	

We have two females of this species, one from Eagle River, Sicamous, Canada, 1st Sept., 1903, collected from *Canis latrans* by Mr. G. F. Dippie, and another from Mabel Lake, British Columbia, 6th May, 1902, taken from *Ursus americanus* by Mr. Allan Brooks.

Length, 3.5 mm.

2. *Ctenopsyllus selenis*, spec., nov.—Close to *Ctenopsyllus hesperomys*, Baker (1904), which we know only from the description, the ♀ alone being described by Baker.

Head.—The three upper bristles of the frontal row are spine-like, being short and stout, while the other bristles of this series are slender, gradually tapering to a fine point. There are two genal spines, as in *Ct. hesperomys*.

Thorax.—The pronotum bears a comb of 26 spines. The mesonotum is one-fourth longer than the metanotum in the ♀, while these two tergites are nearly equal in length in the ♂. In *hesperomys* the mesonotum is said to be twice the length of the metanotum (♀). The number of hairs on the metathoracical epimerum is slightly variable, there being usually 3, 3, 1 in the ♂, and one or two more in the ♀.

Abdomen.—The tergites bear, like the metanotum, some short teeth at the apex, being, moreover, minutely serrated. The numbers of these

teeth are on the two sides together in the ♂ 6, 6 or 7, 5 or 6, 4 to 6, 2 to 4, 2, and in the ♀ 4 to 6, 6 to 8, 5 or 6, 2 to 6, 0 or 2, 0. The sternites of segments 4 to 6 bear in ♀ on each side a row of four bristles, the sternite of the seventh segment a row of seven or eight bristles, there being in the ♂ three bristles on the sternites of segments 3 to 7. At the apex of the seventh tergite there are three bristles in both sexes, the first and third being in the ♂ rather shorter, but somewhat thicker than the lower bristles of the postmedian row, while in the ♀ the third bristle attains nearly the length of the central one, the upper bristle being as short as in the ♂. The stylet of the ♀ is about two and one-half times as long as it is basally broad.

Legs.—There are on the outer side of the hind femur two bristles behind the ventral subbasal sinus, one bristle above the sinus and a small subventral one further back ; posteriorly at the apex there are two subventral bristles on the outer side and one on the inner.

The proportional length of the mid and hind tarsal segments is as follows :

Mid tarsus, ♂	17	12	9	6	11
" ♀	18	14	9	6	11
Hind tarsus, ♂	29	17	11	7	11
" ♀	33	19	13	8	11

Modified Segments.—♂. The eighth sternite is rounded truncate at apex, bearing a number of long bristles (Fig. 43, VIII st). The manubrium (M) is acuminate and slender. The process (P) of the clasper reaches to the apex of the finger, its tip being rounded. The finger (F) has the shape of a half crescent, the distal (= ventral) edge being almost regularly rounded, bearing three long and some short bristles. The ninth sternite bears five long bristles and a number of small hairs (IX st). ♀.—The seventh sternite bears a small sinus. On the eighth tergite there are three or

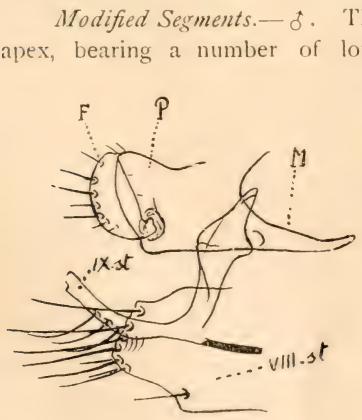

FIG. 43.

four small hairs above the stigma and one long bristle, and one or two small hairs below the stigma. At and near the apical and ventral margins of this tergite there are seven to eleven long bristles and four to six smaller ones proximally of the long ones, the apical edge bearing besides three long and four short bristles.

Length : ♂, 1.3 mm.; ♀, 2 mm.

The following is a list of the specimens we have in our collection :

1 ♂.—Horse Creek, Upper Columbia Valley, Canada, 13th Oct., 1903, *Peromyscus canadiani*, G. F. Dippie.

1 ♂.—Horse Creek, Upper Columbia Valley, Canada, 14th Feb., 1901, *Microtus Drummondi*, G. F. Dippie.

1 ♂.—Blackfalds, Alberta, Canada, 11th Aug., 1904, Kangaroo mouse, A. D. Gregson.

2 ♀.—Kicking Horse Canyon, British Columbia, 6th Oct., 1903, *Evotomys gapperi*, G. F. Dippie.

3 ♀.—Red Deer, Alberta, Canada, 4th Aug., 1901, *Evotomys gapperi*, G. F. Dippie.

3. Ctenopsyllus hamifer, spec. nov.—This species bears, like the preceding species and *Ct. hesperomys*, Baker (1904), a genal ctenidium of two spines. The insect agrees very closely with *Ct. selenis*, except in the genitalia.

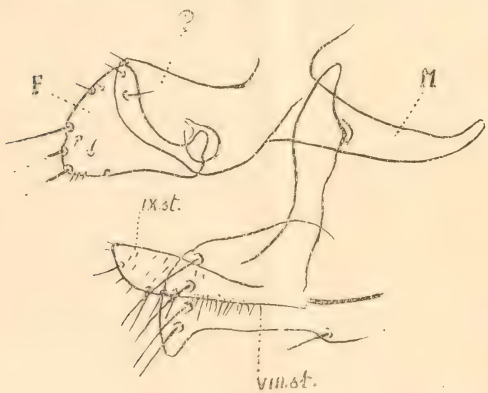

Fig. 44.

Head.—Only the upper two bristles of the frontal row are short and spine-like.

Thorax. — The metathoracical epimerum bears nine bristles, 4, 4, 1.

Abdomen.—The abdominal sternites of segments 4 to 6 bear on each side a row of four bristles, while the seventh segment has a row of five.

Modified Segments.—♂. The eighth sternite (Fig. 44, VIII st.) is apically produced downward, bearing at some distance from the apical edge four long bristles. The manubrium (M) is rather broader than in *Ct. selenis*. The clasper is longer and the finger (F) larger and quite

different in shape. The finger bears three long bristles, one standing at the ventral corner and two above it; they are broken in our only specimen. The ninth sternite (IX st.) is also very different from that of *Ct. selenis*, being much broader. It bears three bristles at the ventral edge, and many small hairs, as shown in the figure.

Length, 2 mm.

We have one ♂ taken off *Mustela* sp. at Blackfalds, Alberta, Canada, on the 10th Jan., 1901, by Mr. A. D. Gregson.

NOTES ON THE YOUNG LARVÆ OF SOME SPECIES OF PULVINARIA.

BY GEORGE B. KING, LAWRENCE, MASS.

Shortly before the destruction of my laboratory in 1903, I began to study some of the young females of several species of *Coccidæ*, for the purpose of determining if there were any constant structural characters present that would enable one to identify the adult female scale, and if there were any characters that could be used to separate closely-allied forms, also what characters could be used in the classification of the several genera. In the following species of *Pulvinaria* all are light yellow in colour, elongate oval; the marginal hairs are alike, the anal lobes do not project beyond their body; six bristles to the anal ring, and six jointed antennæ, all very much alike, the first usually short, with the third and sixth longest. The larvæ studied were dead, dry examples, hatched in confinement, and may have been in some instances of a different colour than yellow, but turned so after long standing.

Pulvinaria Tinsleyi, King, 1900. — Unfortunately, but one poor example was found. The antennæ showed 6 joints: (1) 16, (2) 16, (3) 32, (4) 16, (5) 20, (6) 40.

Pulvinaria occidentalis, Ckll., 1894.—Boiled in potash, very dark brown, internal juice removed colourless, 460 long, 270 broad. Legs: coxa 36, femur + trochanter 64, tibia 52, tarsus 40, rostral loop stout, 160 long; bristles of the anal ring 40 long. Anal lobes with one long bristle and two short simple spines 12 long. Antennal joints: (1) 20, (2) 16, (3) 36, (4) 20, (5) 24, (6) 28; the hairs on the several joints are quite long.

Pulvinaria Cockerelli, King, 1899.—Length, 136; breadth, 200. Antennal joints: (1) 20, (2) 12, (3) 32, (4) 16, (5) 20, (6) 32. Leg:

coxa 20, femur + trochanter 48, tibia 44, tarsus 24 long. Bristles of anal wing 28 long. Anal lobes have one long bristle and two short spines. Rostral loop short, 120 long.

Pulvinaria amygdali, Ckll., 1896.—Treated with potash, light yellow brown; internal juice removed colourless, 400 long, 180 broad. Segments of the antennæ: (1) 20, (2) 16, (3) 24, (4) 16, (5) 16, (6) 28 long. Front leg: coxa 32, femur + trochanter 48, tibia 32, tarsus 28 long. Rostral loop short, 140 long. Anal lobe with one long bristle and two short spines.

Pulvinaria Ehrhorni, King, 1901.—Larva 520 long, 260 broad. Antennal joints: (1) 16, (2) 20, (3) 32, (4) 20, (5) 20, (6) 40 long. Bristles of anal lobe 340 long, the two spines 20 long. Rostral loop very stout, 240 long. Front leg: coxa 24, femur + trochanter 60, tarsus 52, tibia 44 long.

Pulvinaria viburni, King, 1901.—Body 520 long, 240 broad. Antennal joints: (1) 20, (2) 16, (3) 28, (4) 16, (5) 20, (6) 40. Front leg: coxa 28, femur + trochanter 72, tibia 68, tarsus 28 long. Hairs of anal ring 48 long, those of the anal tubercule 342 long, spines 20 long, rostral loop 188 long. All the above measurements are in micromillimeters.

AN ALASKAN MOSQUITO.

BY C. S. LUDLOW,
Laboratory of the Office of the Surgeon-General, U. S. Army, Washington, D.C.

Among some mosquitoes lately sent from Alaska is a species which, coming from the far north (65° N.), has the unique position of standing near three mosquitoes found in much warmer climates, *i. e.*, *Theobaldia annulata*, Shrank, found in Europe, Mexico and California, an Italian species of which Falbici says, "Fin ora fu trovata solamenta a Macarese ed a Pato," and *penetrans*, R. Desvoidy, found in France.

Theobaldia Alaskäensis, n. sp.—Female.—Head dark brown, covered with white curved scales, and dark brown forked scales on the occiput, with flat white scales on the sides, and extending down under the labium; a few brown bristles around and between the eyes; antennæ dark brown, heavy white pubescence and sparse brown verticels, first and second joints with some white flat scales, basal joint testaceous, with a few white flat scales on the median side;

palpi dark brown, sparsely covered with white flat scales and a few hairs ; proboscis yellowish from base about two-thirds its length, the apical third dark brown, the whole sparsely covered with thin white flat scales ; the effect of the proboscis under the hand lens is not, however, of a band, the proximal part being merely of golden-brown tinge, and the distal part darker ; clypeus brown ; eyes dark blue-green.

Thorax dark brown ; prothoracic lobes with a few white curved scales ; mesonotum sparsely clothed with rather large white curved scales, and some brown bristles, which do not, however, form any ornamentation except for two tiny faint white submedian spots nearly midway of the mesothorax, which only show in rather perfect specimens ; when denuded there is a suggestion of a dark median line ; pleura dark brown, with white flat spatulate scales ; scutellum dark brown, the white curved scales being grouped distinctly on the lobes, the interlobular part naked ; eight long brown marginal bristles on mid and six on the side lobes, a few lighter bristles above ; metanotum brown.

Abdomen dark brown, with dark brown scales and white bands, mostly basal, but sometimes very slightly apical, and in some specimens develop into very narrow lateral spots, especially on the distal segments ; occasional white scales scattered through the brown ; second segment with a narrow median line, apical almost wholly white scaled ; apices and sides of segments rather profusely supplied with light-coloured hairs ; venter mostly white scaled.

Legs : Coxæ and trochanters all brown, with white scales ; femora dorsally brown, scaled with a sprinkling of white scales, ventrally white, a small light apical spot, but no ring as in *annulata :* tibiæ and metatarsi also brown, sprinkled with white, with small light apices ; first and second tarsal joints in all the legs with narrow basal light (ochraceous) spots not always amounting to bands ; remainder of tarsi brown, except on the hind legs, where sometimes the base of 3rd and 4th joints have a few white scales, not noticeable with a hand-lens ; ungues large, simple and equal.

Wings brown ; costa, subcosta and first long veins heavily scaled with long truncate scales, mostly brown, but sprinkled with a few white scales ; these are also found on the stem of the fifth ; the second, third, fourth and sixth veins clothed with long, slender, brown scales ; lateral scales narrowly lanceolate, median truncate but slender, aggregated so as

to form four small but distinct spots, occurring at the root of the second, the bases of the fork cells, and at junction of cross veins; first submarginal cell about one-third longer and a trifle narrower than second posterior, both stems about one-half the length of the latter; cross-veins nearly of one length, and almost in a line; ventral scales long and slender; halteres, light stem, dark knobs.

Male.—Much as female; antennæ give banded appearance; verticels light brown; palpi as long or longer than proboscis, dark brown, with a light band at base of apical joint, plumes brown except at the light band, where they are yellowish; very marked contraction at the distal end of the second abdominal segment, giving a "wasp waist" effect; legs as in female, but the bands distinct and fairly wide, especially on the hind legs, where there is a narrow band on the third tarsal; in the fore and mid legs this joint has only a suggestion of a band; fourth joint brown; ungues large, unequal in fore and mid legs, the larger biserrate and the smaller uniserrate, in hind legs large, simple and equal.

Length, 10–11 mm. Habitat, Fort Egbert, Alaska. Taken May–June.

Type, No. 9959, U. S. N. M.

Described from five females and one male sent me by 1st Lieut. J. R. Bosley, Asst. Surg. U. S. Army, in two collections from Fort Egbert, Alaska.

It is closely related to both *annulata*, Shrank, *Falbici*, No., and *penetrans*, Desvoidy. Differs from the former in that it has only the tiny spot on the thorax; there is no band on the female palpus, and only one on the male; there is no ring on the femur, and the leg bands are much narrower and ochraceous rather than white.

It differs from *Falbici* also in the thoracic marking; the palpi are only white scaled; the median stripe on the second abdominal segment; the tarsal bands are basal only, and the mid ungues of the male have only one tooth on the smaller. It apparently reverses the colouring of *penetrans*, and has only four "maculis plus minusve distinctis."

It is possibly not out of place to state here that the specimens from San Francisco, Cal., which otherwise agree well with Theobald's description of *T. annulata*, Shrank, lack the mid band on the metatarsi, and that three, and sometimes even four, tarsal joints are minutely banded.

A FEW NEW COCCIDÆ, WITH NOTES.

BY EDW. M. EHRHORN, SAN FRANCISCO, CAL.

Orthezia Californica, sp. n.—Female about 4½ mm. long, 3½ mm. broad, and 2 mm. high. Body flat, very firm, and covered with thick lamellæ of a light brown colour. Margin beset with broad wax lamellæ, which grow larger caudad, ending in two, which form a shield-like process. There are three shield-like lamellæ on the anterior part of the dorsum; caudad of these is a deep carina, formed by two rows of lamellæ running parallel and ending at the caudal shield-like process. Antennæ and legs dark brown, beak quite stout. Female measures with egg-sac 5 mm. Egg-sac about as broad as long, and is square at caudal end, covering entire ventral abdomen. Colour white, formed of bands of white wax closely attached to each other. The caudal ends are of a light brown colour. Body of female after boiling in K. O. H. remains light brown, antennæ, legs and mouth-parts dark brown. Derm is covered with innumerable blunt, tube like spinnerets. Antennæ 8-jointed, each joint with several short, stout spines. Joint 8 ends in an elongated glassy process. Joint 1 longest, joints 2 and 3 subequal and next in length, joints 6 and 7 subequal and shortest. Formula: 1 (2, 8), 3, 4, 5 (6, 7).

Measurements of antennal joints in μ: 1, 320; 2, 280; 3, 160; 4, 145; 5, 140; 6, 120; 7, 120; 8, 280. Legs very long and stout, with several rows of short, stout spines running longitudinally. Femur about twice as long as tarsus. Tibia with two stout spines. Claw slightly curved, with two stout spines. Measurements of middle leg in μ: Coxa, 300; trochanter and femur, 1,000; tibia, 740; tarsus, 440; claw, 120. Anal ring large, with 6 long stout hairs, about 260μ. Eggs lemon-yellow. Young larva covered with a dense white secretion, colour of body orange-yellow. Antennæ and legs light brown. Antennæ of 6 joints. Joint 6 longest, nearly twice as long as 2. Joints 3 and 5 equal, joint 4 shortest. Formula: 6, 1, 2 (3, 5), 4. Measurements in μ: 1, 100; 2, 80; 3, 60; 4, 40; 5, 60; 6, 150.

Habitat.—On *Bahia* sp., Mayfield, Santa Clara Co., California.

Kermes Rattani, sp. n.—Adult female globose, from 5 to 6 mm. in diameter, varying a little according to position on twig. Surface smooth, not shiny, nor hardly pubescent, sometimes waxy. Colour light brown, generally with four white stripes running parallel with segmentation. When seen through lens these stripes have numerous brown dots at

intervals. Derm, after boiling in K. O. H., becomes colourless, with numerous round gland-orifices and small brown dots. Antennæ 6-jointed, indistinctly segmented, joint 3 apparently longest.

Larva reddish-purple, slightly covered with secretion. Derm, after boiling in K. O. H., colourless. Legs and antennæ and caudal tubercles yellowish-brown. Antennæ 6-jointed. Joint 3 longest, joint 4 shortest, joints 2 and 5 subequal. Formula approximately 3, 6, 1 (2, 5), 4. Body elongate oval, about twice as long as broad. Margin with short, stout spines. Caudal tubercles rounded and very prominent, with three stout spines. Caudal setæ long and stout. Legs short and stout. Tibia two-thirds of tarsus. Tarsus one-quarter shorter than femur. Claw long and slender, slightly curved. Digitules long, fine, knobbed hairs. Anal ring with six long stout hairs, reaching to end of tubercle.

Male sac of snow-white felt, elongate oval, convex above, about 1½ mm. long and ½ mm. broad; sometimes flakes of yellow wax are found on sac.

Male is very small, abdomen dark red, thorax and head black, wings iridescent. Stile well developed. Antennæ 10-jointed, joints sausage-shaped, very hairy. Joint 1 shortest and stoutest, joints 5, 6, 7 longest and subequal. Formula: (5, 6, 7), 2, 4, 8, 9, 10, 3, 1.

Legs long and slender. Femur stout, shorter than tibia. Tibia with stout spines. Tarsus about half of tibia. Claw long and slender, and well curved. Digitules fine hairs.

Hab.—On *Quercus chrysolepia*, Stevens Creek Canyon, Mountain View, California. Named in honour of my friend, Prof. Volney Rattan, of San Jose, Cal., for whose kind assistance in botany I am under great obligation.

Eriococcus bahiæ, sp. n.—Adult female enclosed in a closely-felted sac, the exterior of which is cream coloured, the interior snow-white. Sac about 3 mm. long and 1½ mm. broad, convex above, more or less flattened below. Eggs reddish-purple.

Body of female tapering, plump, shiny, about 2½ mm. long and 1 mm. broad. Segmentation distinct. Colour dark crimson-purple. Legs and antennæ light brown. Margin with short white filaments. When boiled in K. O. H., derm is colourless, antennæ, legs and mouth-parts remaining light brown. Margin with a row of stout conical spines. Dorsal surface covered with small stout spines. Antennæ 7-jointed, quite hairy. Joint 3 longest, joints 2, 5, 6 subequal and shortest. Formula: 3, 4 (1, 7), (2, 5, 6).

The following variations have also been observed :

3, 4 (1, 7), 2, 5, 6.
4, 3, 7 (1, 2), 5, 6.
3, 4 (1, 7), 2 (5, 6).

The measurements of joints in μ are as follows : Joints 1, 36–40 ; 2, 32–36 ; 3, 60 ; 4, 52–64 ; 5, 24–28 ; 6, 20–24 ; 7, 40–42. Legs long and slender, each segment with several long bristles. Coxa very stout, 80μ long by 112μ broad. Femur and tarsus subequal. Tibia shorter than tarsus. Claw stout and curved. The measurements in μ are : Coxa, 50 ; trochanter plus femur, 200 ; tibia, 136 ; tarsus, 148 ; claw, 24. Anal ring large, with 8 stout hairs (100μ). Young larva crimson-purple, very active. Antennæ and legs light brown, antennæ of 6 joints. Joint 3 very much the longest. Formula : 3, 6, 1, 2 (4, 5). The measurements of joints in μ are : Joints 1, 16–28 ; 2, 16–20 ; 3, 36–40 ; 4, 16–20 ; 5, 16 ; 6, 27–28.

Caudal tubercles well developed, with long bristle (180μ) and several stout spines. Margin beset with very stout spines.

Habitat.— On the roots of *Bahia* sp., Stevens Creek Canyon, Mountain View, California.

Eriococcus Howardi, sp. n.—Female enclosed in a snow-white, closely-felted sac, about 3½ to 4 mm. long and 2 mm. broad, tapering, quite convex above, not carinated. Body of female when dry very much shrivelled, colour reddish-brown. When boiling in K. O. H., gives off a dark crimson colour. Derm colourless, with innumerable stout, slightly curved spines of various lengths. Legs and antennæ light brown. Mounted specimens measure about 2 mm. long and 1½ mm. broad. Antennæ 8-jointed, each joint with several hairs. Joint 3 longest, sometimes subequal with joint 8. Joints 6 and 7 subequal. Formulæ :

3, 8 (1, 2), (4, 5, 7), 6.
3 (2, 8), 1, 4, 5, 6, 7.
(3, 8), (1, 2), (4, 5), 6, 7.

Measurements of joints in μ are as follows : 1, 40 ; 2, 40–48 ; 3, 48–52 ; 4, 28–36 ; 5, 28–32 ; 6, 20–28 ; 7, 24–36 ; 8, 48. Each antenna is equal in length to tibia + tarsus + claw. Legs moderately short and stout. The measurements in μ are : Coxa, 192 ; trochanter, 60 ; femur, 200 ; tibia, 200 ; tarsus, 96 ; claw, 40. Digitules of tarsus long fine knobbed hairs, those of claw short fine knobbed hairs. Anal ring

ordinary, with 8 long hairs (170μ). Caudal lobes very stout and long (100μ by 80μ broad), cone-shaped, with long stout setæ about 180μ, and several stout spines.

This species resembles *E. borealis*, Ckll., in having 8-jointed antennæ, but differs in other respects very much from it. Named in honour of Dr. L. O. Howard, Entomologist of the Dept. of Agriculture, Washington, D. C.

Habitat.—On *Quercus* sp., Calaveras Valley, Santa Clara Co., Cal.

Eriococcus Catalinæ, sp. n.—Adult female enclosed in a snow-white sac in masses among the fine leaves of the plant, about 3½ mm. long and 1½ mm. broad. Colour of body dark purple, legs and antennæ light brown. When boiled in K. O. H. liquid turns purple and body becomes transparent. Derm covered with numerous spear-head-shaped spines and many round glands. Anal ring large, with 6 long hairs. Caudal lobes inconspicuous, setæ long. Antennæ 7-jointed, joint 7 longest, rounded at tip, with numerous hairs, joint 1 next in length, other joints vary considerably, as the following formulæ will show. Formulæ :

7, 1 (2, 4), 6, 3, 5.
7, 1, 2 (4, 6), 5, 3.
7 (1, 2), 4 (3, 5, 6).
7, 1 (2, 6), (3, 4, 5).

Measurements of antennal joints in μ are : 1, 40 ; 2, 28–40 ; 3, 24 ; 4, 24–36 ; 5, 20–28 ; 6, 24–32 ; 7, 60–68. One specimen with 6-jointed antennæ measured as follows : 1, 40 ; 2, 32 ; 3, 48 ; 4, 28 ; 5, 32 ; 6, 68.

Legs short and stout like Ripersia. Coxa, 80μ ; trochanter plus femur, 152μ ; tibia, 80μ ; tarsus, 52μ ; claw, 20μ. Tarsal digitules 36μ long fine hairs, those of claw much shorter.

This species is very closely allied to *E. artemisiæ*, Kuw., but is a smaller species, differs in the antennæ, and does not infest the root and trunk of the plant.

Habitat.—On *Artemisia* sp., Catalina Island, Cal.

I also found *Saissetia oleæ*, Bern., on *Rhus integrifolia*, small specimens about 2½ mm. long by 2½ broad, not very convex. Antennæ averaging this formala : 3, 8 (2, 4), 5, 1 (6, 7). *Aspidiotus rapax*, Comst., was also found on the same plant and other shrubs.

Phenacoccus Colemani, sp. n.—Adult female salmon pink, thinly covered with mealy secretion about 2½ mm. long and 1½ mm. broad. Segmentation distinct. Legs and antennæ light brown, eyes black. Female with

egg-sac about 5½ mm. long. Sac loosely woven of greenish-tinged cotton, not dense enough to hide the lemon-coloured eggs. Larvæ orange-yellow.

Female, when boiled in K. O. H., derm first turns reddish-brown, then becomes colourless. Antennæ and legs light brown. Antennæ 9-jointed, joint 9 longest, joint 1 and 5 subequal, joints 4, 6, 7, 8 shortest and subequal. Formula: 9, 2, 3 (1, 5), (4, 6, 7, 8). Each joint with several slender hairs. Joint 9 always the longest, and joints 7 and 8 always the shortest; the other joints sometimes vary a little, and the following formulæ may assist in determining:

9, 2, 3 (1, 5), 4 (6, 7, 8).
9 (2, 3), (1, 5, 6), (4, 7, 8).
9, 2 (1, 3, 5), (4, 6), (7, 8).
(9, 2), 3 (1, 5), 4 (6, 7, 8).
(9, 2), (1, 3, 5), (4, 6), (7, 8).
(9, 2), 3 (1, 4, 5), (6, 7, 8).

Legs long and stout, with numerous hairs. Coxa quite stout, with long stout bristle, about half as long as tibia. Tibia a little longer than femur. Tarsus about half as long as femur. Claw long and slender, slightly curved, with small denticle. Digitules of tarsus long fine hairs, those of claw club-shaped hairs.

Habitat.—On stems and leaves of *Rubus* sp., on Pescadero road, south of Palo Alto., California, June 5, 1900.

Pseudococcus juniperi, sp. n.—Adult female oval, about 2 mm. long and 1 mm. broad, convex, slightly covered with secretion. Egg-sac small. Young larvæ reddish. Adult female, when boiled in K. O. H., turns dark crimson. Derm colourless, with numerous short, straight spines on the dorsum. Antennæ 8-jointed. Joint 8 longest, joint 1 and 7 subequal. Joints 4, 5 and 6 about equal and shortest. Formula: 8, 3, 2 (1, 7), (4, 5, 6), also 8, 3, 2, 7, 1 (4, 5, 6). Legs long and slender. Femur and tibia about equal. Tarsus about half of tibia. Tarsal digitules fine knobbed hairs. Claw small, slender and curved, with curved, club-like digitules reaching to end of claw. Measurements of leg joints in μ: Coxa, 96; trochanter, 48; femur, 192; tibia, 192; tarsus, 95; claw, 24. Caudal lobes rounding, with one very long, stout bristle (200–212μ) and three short, stout spines on the outer and one on the inner margin. Each lobe has numerous round gland orifices. Anal ring large, oval, about 80 by 60μ, with six long hairs about 220μ.

Habitat.—On *Juniperus virginiana*, Ashforks, Arizona.

Ripersiella Kelloggi, Ehrh. and Ckll., sp. n.—Proc. Biolog. Society of Washington, Vol. 14, Aug. 9, 1901. Adult female generally attached to the roots of grass, producing a small quantity of white cottony secretion, which generally incases the body. Colour creamy-white, about 1½ mm. long and 1 mm. broad, oval, sometimes pyriform, shiny. Segmentation not very distinct. When placed in K. O. H. derm turns yellow, but becomes transparent, so that it is difficult to find it on the slide. Antennæ very close together, about 15μ, 5-jointed, quite hairy. Joint 5 longest, longer than 2+3+4, which are subequal. Formula: 5, 1 (2, 3, 4). Legs very short and stout. Femur very stout, about as long as tibia plus tarsus. Tibia about as long as tarsus, with two stout bristles, about 8μ. Tarsus with stout bristle. Claw long and slender. Digitules fine hairs. Caudal tubercles inconspicuous, with short fine bristles. Anal ring very small, with six short fine hairs.

Habitat.—On the roots of *Bunch grass*. Stevens Creek, Mountain View, Cal.

In the Proceedings of the Biolog. Soc. of Washington, Aug. 9, 1901, Mr. Cockerell says: "This species was found by Mr. Ehrhorn on the roots of *Bunch grass* at Mountain View, Cal., in December, 1898, but no description has yet been published. It is easily recognized by the characters mentioned above. The length of the last antennal joint is about 30μ. The mouth-parts are ordinary, the labium not elongated."

This species was sent to Prof. Tinsley, when he established the new genus *Ripersiella*, and I had expected him to describe it, but after a long silence my slides and notes were returned to me. In the above description I have added a few more important characters, which will aid in the determination.

Pulvinaria plucheæ, sp. n.—Female scales dark brown, about as broad as long, varying from 3 to 4 mm. Ovisac snow-white, ribbed longitudinally and varying in shape and length, according to position on twig, from 3 mm. broad to 5 or 7 mm. long. After boiling in K. O. H. derm is colourless. Marginal spines straight, slender and sharp, and hard to detect on slide. Anal plates heart-shaped, with three slender spines at tip and two bristles on outer margin. Anal ring with long stout hairs. Antennæ with a few slender hairs, quite stout and 8-jointed. The

average sequence of joints is as follows: Joint 3 longest, 2 and 4 subequal, next 1, sometimes 1 and 5 subequal, next 8, joints 6 and 7 shortest, sometimes subequal. Formula: 3 (24) 15867. Joints measure in μ: 1–48, 2–60, 3–72, 4–60, 5–44, 6–28–32, 7–28–30, 8–40. Legs short and stout. Measurements of middle leg in μ: Coxa, 30–35; femur with trochanter, 85; tibia, 60; tarsus, 33; claw, 12. Digitules club-shaped, extending beyond claws. Hairs and spines of this species are few and are very short and fine.

Habitat.—At San Diego, Cal., on *Pluchea sericea*. It covers the twigs quite thickly. A Chalcid fly attacks the female when the cottony sac is forming, but does not seem to materially check the scale.

NEW SPECIES OF PERLIDÆ.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

In looking over my collection preparatory to a rearrangement of the forms, I find several new species, that I describe below. One of them represents an interesting new genus, allied to *Nemoura*. I have added illustrations of the genital structures, as these are of considerable value in the determination of the species. I hope soon to be able to prepare a revision of our species of this family, one of the most primitive of existing winged insects.

Acroneuria pumila, n. sp.—Head uniformly yellowish, without marks; antennæ and pronotum duller yellowish; thorax and abdomen more brownish; legs yellowish; setæ pale yellow. Wings hyaline, venation yellowish. The ocelli form a triangle a little shorter than equilateral, posterior ocelli very much closer to each other than to eyes; pronotum narrowed behind, very rugose above on each side, the smooth median space much wider behind than elsewhere. Wings only a little longer than the abdomen; many cross-veins in apical region, but not in submarginal space; many costal cross-veins, and five or six beyond the end of subcosta; six to eight cross-veins in both cubital and median series. Ventral plate of female much more produced than in any described form.

Length, 17 mm. One female from Three Rivers, California (Baker). It is the smallest species of the genus in our country, but it is probable that other specimens will be larger, as these forms are variable in size.

October, 1906.

Perla luctuosa, n. sp.—Head rather orange-yellow, a large black spot covering ocelli, a transverse dark spot on clypeus, posterior angles of head

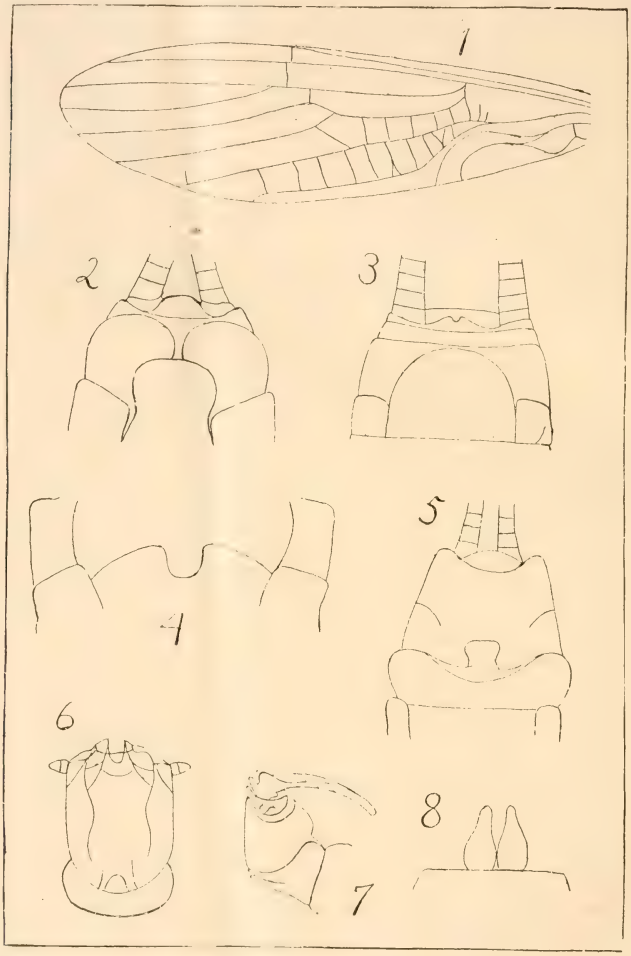

FIG. 45—

1. Perlomyia collaris, fore wing.
2. Isoperla longiseta, ventral plate.
3. Acroneuria pumila, ventral plate.
4. Perla luctuosa, ventral plate.
5. Isoperla sordida, ventral plate.
6, 7, 8. Genitalia of Leuctra grandis.

behind the eyes black ; basal part of antennæ yellowish, beyond the sixth joint blackish ; pronotum orange-yellow, a broad black mark each side, but leaving the margins pale ; thorax and abdomen blackish, margins of ventral segments and the last segment yellow ; setæ yellowish, tip darker ; legs yellowish, darker above on base of tibiæ, and the tarsi dark ; wings distinctly yellowish, venation blackish, base of radius and median yellowish. Head rather broad, eyes not very large, ocelli small, the triangle broader than long, posterior ocelli nearer to eyes than to each other ; pronotum short, slightly narrowed behind, sides straight, corners sharp, not very rugose above. Fore wings with two cross-veins beyond the end of the subcosta, about eight cross-veins in both median and cubital series, three branches to radial sector beyond anastomosis, in both specimens there is a closed cell just beyond anastomosis, between radial sector and median vein.

Expanse, 34 mm. Two specimens from San Francisco, Cal.

Isoperla sordida, n. sp.—Dull yellowish, an indistinct V-mark connecting the ocelli ; a broad dark mark each side on the pronotum ; antennæ brownish on apical half ; tips of tarsi brownish ; wings flavescent, with entirely pale yellowish venation. Head rather broad, ocelli form equilateral triangle, the posterior ocelli about as close to the eyes as to each other ; pronotum as broad behind as in front, sides barely convex, quite rugose above ; setæ short, not as long as the abdomen, the joints short. Wings quite long, about three cross-veins beyond subcosta, several costal cross-veins, radial sector forked once about one-third to one-half way out ; about six cross-veins in cubital and median series, radial sector arising fully one-half way to anastomosis.

Expanse, 24 mm. One specimen from Los Angeles, California (Hutchinson).

Isoperla longiseta, n. sp.—Dull yellowish ; ocelli connected by black V-mark ; antennæ dark beyond middle ; pronotum with faint dark mark each side, extreme margins pale ; lobes of thorax brown ; abdomen yellow-brown ; setæ yellowish, darker on tips ; tips of tarsi dark ; hind tibiæ with a faint dark mark above near base ; wings hyaline, yellowish on costal margin, venation pale, rather darker in middle and apical parts. Ocelli form an equilateral triangle, the posterior ocelli a trifle nearer to eyes than to each other ; pronotum only a little narrower behind than in

front, sides straight, corners acute; setæ very long, much longer than abdomen, joints long. Wings rather large, almost acute at tip, one cross-vein beyond subcosta, radial sector almost geniculate at origin, almost one-half way to the anastomosis, forked once about one-third way out, four or five cross-veins in median and cubital series.

Expanse, 17 mm. Two specimens from Onaga, Kansas (Crevecœur).

PERLOMYIA, n. gen.—No anal setæ; second joint of tarsi much shorter than others; no oblique cross-veins from radius beyond end of subcosta; radial sector furcate shortly beyond cross-vein; third apical cell narrowed at base; cubital series of cross-veins extending much beyond median series; radial sector and median vein arise from the radius at the same point; hind wings with large, folded anal space; and the radial sector, median vein and cubitus all arise from the arculus.

Perlomyia collaris, n. sp.—Black, antennæ and apical joints of the legs more brown; wings smoky, venation brown. Pronotum plainly longer than broad, its corners rounded, above it is rugulose each side. Wings long, not rolled; one basal costal cross-vein, no others; the median cell is narrowed at tip and closed before end of discal cell; all apical cells very long; about seven cross-veins in median series, and one or two before the arculus; about 10 or 11 cross-veins in cubital series, three or four beyond last of median series. In hind wings there are only two or three median and cubital cross-veins, and the radial sector is forked just beyond the cell.

Expanse, 23 mm. One specimen from Wellington, Brit. Col. (Taylor).

Leuctra grandis, n. sp.—Head and pronotum dark brown, clothed with short fine hair; antennæ black, basal joints paler; thorax yellow-brown; abdomen dark brown; legs yellowish; wings fumose, venation brown. Ocelli small, posterior ocelli fully three times as close to eyes as to each other; third joint of antennæ plainly longer than fourth. Wings rather long; fore wings with about six cross-veins in median series, and eleven or twelve in the cubital series; in the hind wings the fork of the radial sector has a pedicel as long as the width of a cell, and is a little farther basad than the fork of the cubitus.

Length, 10 mm. Several specimens from Black Mts., N. Car. (Beutenmüller), June. This is our largest species of the genus.

NEW RHYNCHOPHORA.

BY CHAS. SCHAEFFER, MUSEUM OF THE BROOKLYN INSTITUTE, BROOKLYN, N. Y.

Conotrachelus tuberculicollis, new species. — Form and size of *juglandis*, but thorax distinctly tuberculate, colour more uniform grayish, and the post-median fascia on elytra indistinct. Head densely covered with ochreous and white scale-like hairs; eyes separated by about the width of the beak; the beak slender, separated from the head by a slight transverse impression, about as long as head and thorax and slightly curved, distinctly tricarinate to about apical third, where it is closely punctate; from base to about middle the surface is sparsely clothed with pale scale-like hairs; antennæ inserted about apical third, first joint of funicle slightly stouter than the second, but of nearly equal length. Thorax as long as broad, sides slightly bisinuate to a little before middle, then abruptly narrowing to apex; surface rather uneven, with coarse punctures and four rather prominent tubercles, of which two are placed at apical margin and two more widely separated at middle of disk, between which the surface is convex; the vestiture consists of ochreous and white scale-like hairs, the white forming at sides a more or less distinct line from base to the median tubercles. Elytra sinuate at sides a little below the oblique humeri, then narrowing to apex; punctures large and broadly confluent on the disk; third interval with three elevated crests, of which the middle is the largest, fifth interval with two tubercles, one near base and a larger before middle, behind middle a costiform elevation not reaching to apex, seventh interval elevated, but feebly interrupted below the humeral callus, surface and crests densely clothed with appressed yellowish-gray and grayish-white scale-like hairs, the pale hairs more condensed at the humeri and behind the median crests. Body beneath with stout yellow hairs; mesosternum narrow between the coxæ, feebly impressed in front; all the femora with an obtuse tooth and small denticle, tarsal claw strongly toothed. Length, 6 mm.

Huachuca Mts., Arizona.

This species, best placed in Leconte's division, I–A, resembles *juglandis* in form, size and elytral crests, but differs from it, as well as from any known North America *Conotrachelus*, by the strongly tuberculate thorax. Of all the described Mexican species with tuberculate thorax, it is perhaps nearest *nodulosus*, but *tuberculicollis* has no decumbent setæ,

the seventh interval is not abruptly interrupted, the ventral segments are not sparsely and finely punctured, and the beak is rather slender, and not "exceedingly stout" as in that species.

Conotrachelus Arizonicus, new species. — In form and general coloration resembling *leucophæatus*, but thorax not as coarsely punctured, and without crests in front, the costæ on elytra feeble and nearly obsolete on the disk, but prominent at apex, the upper surface with short semi-erect setæ. Head densely punctate, clothed with ochreous hairs, eyes separated by the width of the beak, the latter feebly curved and moderately stout, strongly convex at base, tricarinate, the intervals between the carinæ rugose, at apex moderately coarsely punctate; antennæ inserted at slightly less than apical third. Thorax broader than long; sides nearly straight and parallel to a little before middle, then strongly narrowing to apex and feebly constricted; surface coarsely punctate, very sparsely clothed on the disk with ochreous and at sides with white hairs, which are inclined forward. Elytra very feebly sinuate below the humeri, the latter rounded; surface with rows of large, closely-placed punctures; alternate intervals feebly elevated on the disk and at sides; at apex the third has two moderately prominent crests, and the fifth and seventh are distinctly elevated; colour brown, with pale brown, white and yellow hairs, the latter more condensed on the second and third interval at base, the white forming a broad, irregular, oblique fascia from the humerus to nearly the middle of suture, the rest more irregularly and sparsely intermixed with white; surface with short, semi-erect pale setæ. Body beneath sparsely clothed with pale hairs, and very coarsely punctate; mesosternum nearly flat, not impressed in front; legs sparsely pubescent, slightly denser on the broadest part of hind femora, femora with one moderate tooth and one feeble tubercle, claws with a small tooth. Length, 4 mm.

Arizona, one specimen in collection Dietz.

This species is to be placed near *nivosus* in Dr. Leconte's table, from which the closely punctured and very sparsely pubescent thorax, the slightly longer beak, the distinct elytral crests and the pale setæ on elytra will separate it.

Conotrachelus ecarinatus, new species.—Brown, elytra clothed very sparsely with pale and ochreous hairs, the latter forming an indistinct band behind middle, costæ almost obliterated, thorax without carina. Head closely punctate, and with short yellowish-white hairs, feebly transversely

impressed between the eyes; beak slightly longer than the head and thorax, and feebly curved, tricarinate, at apex rather closely punctate, punctures elongate at sides, and larger than at middle; antennæ inserted at about apical fourth. Thorax slightly broader than long; sides nearly straight to slightly before middle, then narrowing to apex, where the impression is feeble; surface with large closely-placed punctures, which are confluent at apex, not carinate, very sparsely clothed with short, forwardly-inclining, decumbent yellowish hairs. Elytra with rows of large punctures, alternate intervals feebly convex: surface with recumbent dark setæ, and very sparsely clothed with white and ochreous hairs, the latter forming an indistinct post-median fascia. Body beneath sparsely pubescent; mesosternum flat, truncate in front, abdomen coarsely punctate, punctures of last segment smaller. Legs slightly annulated, femora with two moderate teeth; claws finely toothed. Length, 4 mm.

Huachuca Mts., Arizona.

There is no sinuation at the sides of the elytra below the humeri, and the sides of elytra are more parallel to slightly behind middle than in any other species of Division I–A of Leconte, where this species has to be placed. This group contains those species which have the claws divergent, toothed, not cleft, prothorax not sulcate, femora bidentate, and elytral costæ interrupted. The three species described above all belong to this group, and to facilitate their identification the following table is presented. Our *anaglypticus*, which occurs in Mexico also, has two crests in front of thorax, and the surface between these impressed, but specimens occur without crest and impression. A few of the species in the following table are not represented in the material before me, and the characters employed had to be taken from the descriptions.

1. Costæ of elytra abruptly interrupted ..... 2.
   Costa of elytra feebly interrupted ..... 5.
2. Thorax strongly tuberculate ..... *tuberculicollis*, n. sp.
   Thorax without tubercles ..... 3.
3. Post-median elytral fascia uniformly white or pale yellow ..... 4.
   Post-median elytral fascia white and yellow; the two post-median elytral crests near suture much larger than the others ..... *nenuphar*, Hbst.
4. The two post-median elytral crests near suture large, more elevated than the others; elytra with a pale-yellow fascia behind middle ..... *juglandis*, Lec.

The interrupted elytral costæ equal, not forming elevated crests; elytral fascia pale yellow or white..... .....*albicinctus*, Lec.

5. Prothorax with small median callus .....*retentus*, Say.
Prothorax carinate or not.....6.

6. Prothorax more or less distinctly carinate. ....7.
Prothorax not carinate .....11.

7. Ventral segments coarsely and closely punctate .....8.
Second, third and fourth ventral segments finely and sparsely punctured... ..... *affinis*, Boh.

8. Upper surface with short erect setæ; femora with two acute spiniform teeth.....*compositus*, Casey.
Upper surface without erect setæ.....9.

9. Thorax distinctly carinate from tip nearly to base; hind femora with a large acute tooth and a small denticle.....*seniculus*, Lec.
Thoracic carina feeble; hind femora with two small denticles..10.

10. All the ventral segments closely and rather coarsely punctate, last ventral without tubercles.....*elegans*, Say.
First and second ventral segments very coarsely, not densely, punctured; fifth finely and more densely punctate, with two distinct tubercles.....*aratus*, Germ.

11. Thorax coarsely punctate, punctures not closely placed, but well separated, and never confluent; elytral costæ almost obsolete on the disk, but visible at apex.....*nivosus*, Lec.
Thorax coarsely and densely punctate, punctures more or less confluent near apex..... .....12.

12. Front femora with a moderate tooth and a small denticle, coloured like *leucophæatus*, but the thoracic white lines indistinct, and the elytra with pale, semi-erect setæ.....*Arizonicus*, n. sp.
Front femora with two rather prominent teeth, of which the one nearest the apex is slightly smaller than the inner; dark-coloured, elytra with a more or less distinct post-median yellowish band and short recumbent black setæ.....*ecarinatus*, n. sp.

Conotrachelus Texanus, new species.—In form and colour resembling a small *fissunguis*, but thorax and elytra with short bristles. Head clothed with white scale-like hairs; beak scarcely as long as head and thorax, feebly curved, trisulcate on each side, apex sparsely punctate on the disk, at sides with a few larger punctures. Thorax shining, slightly

broader than long, sides very feebly narrowing to a little before middle, then more strongly narrowing to apex, scarcely impressed, surface with large, closely placed punctures, which are confluent at apex, very sparsely clothed with short, stiff bristles. Elytra not impressed laterally below the humeri, which are rounded; punctures large and closely placed; intervals feebly convex; surface clothed with white and pale-yellowish hairs, not forming a fascia or band, with some erect, pale, short bristles intermixed. Body beneath and legs sparsely pubescent; mesosternum flat, feebly rounded in front; abdomen coarsely and closely punctate; femora with a moderate tooth; claws cleft, the inner portions touching each other. Length, 3·5 mm.

Brownsville, Texas.

By the cleft claws and erect setæ, this species has to be associated with *erinaceus*, *echinatus* and *hispidus*. From *echinatus* the toothed femora and the short bristles of thorax and elytra will separate it, and from the other two the shorter setæ of the upper surface, the more closely punctate abdominal segments, the stouter and larger form, and the distinctly carinate beak.

Cryptorhynchus lacteicollis, Champ.—Oblong oval; elytra blackish-brown, with sparsely placed yellowish scales, and with a number of reddish, shining tubercles; thorax uneven, densely clothed with white scales, on each side of middle of base two distinct darker spots. Head coarsely and closely punctate, with closely placed ochreous and white scales; front deeply impressed, between the eyes flat and carinate, above each eye a tuberculiform elevation; beak stout, feebly arcuate, rather coarsely and confluently punctured, finer towards apex; antennæ inserted at about middle of beak, funicle seven-jointed, with the first stouter and shorter than second, club elongate-oval, one-jointed, as long as the preceding five joints, finely pubescent. Thorax twice as wide as long, sides feebly narrowing from base to a little before middle, then strongly narrowing to the distinct subapical constriction; surface uneven in apical half, on each side of the median carina, the latter starting from the subapical impression to middle, and from here to base is a feeble impressed line; on each side two more or less distinct tubercles, one at about apical third and one at about basal third; apical margin at sides feebly emarginate, ocular lobes therefore feeble; base bisinuate, the feeble

basal lobe truncate at apex; surface very densely clothed with white scales, slightly less densely around the apical irregularities; on each side of median line is a darker spot of larger size, and near the basal angles on each side a smaller one. Elytra with irregular placed, not deeply impressed, punctures, and some reddish tuberculiform elevations; surface uneven, clothed with blackish-brown and pale-yellow small scales; near base at about middle, between the two median tubercles and near each of the two subapical tubercles, is a velvety-black spot of variable size, each surrounded by yellow scales. Abdomen alutaceous, sparsely punctate, with broader white and narrower, elongate, yellowish scales; mesosternum broadly and deeply excavated; anterior femora with an obliquely truncate-emarginate, moderately broad tooth, middle and hind femora with an obtuse tooth; tibiæ shorter than the femora, tarsal claws simple. Length, 6–7 mm.

Palmerlee, Cochise Co., Arizona.

A small number of this fine species was taken by beating mistletoe growing on walnut, and was first discovered by Mr. H. G. Barber.

After sending in the above description of this species, Vol. IV., pt. 4, pp. 601–729 of the "Biologia" was received, in which on p. 650 the species was described from a single specimen from Taxpam, Vera Cruz, Mexico.

The Mexican specimen is said to have two teeth on the anterior femora, while the Arizona specimens have the tooth obliquely emarginate truncate. The emargination of the tooth is very likely very strong in the Mexican specimen, giving the appearance of "a conspicuous additional tooth on the outer edge of the larger one."

The suture between the first and second ventral segments is more or less arcuate, which makes the second segment, especially at middle, longer than the third or fourth, but this is not in all specimens so well pronounced. In some of our species, placed in *Cryptorhynchus*, the first suture is not exactly straight as required, but it seems, from the variation observed in this respect, that not much stress can be laid on this character.

The form is more elongate than any of the North American species. This, together with the peculiar coloration and sculpture, makes it easily recognizable.

ON DR. WM. DIETZ'S REVISION OF THE TINEIDÆ (HEINEMANN).

BY AUGUST BUSCK, WASHINGTON, D. C.

The long-expected paper by Dr. Wm Dietz, entitled: "Revision of the Tineid Subfamilies, *Amydriinæ* and *Tineinæ*, inhabiting North America,"[1] appeared during the writer's absence in Europe, and a subsequent summer's expedition to the West Indies made it impossible to give this important contribution to the knowledge of our American Tineidæ the attention it deserved before early this year. Since then I have gone carefully over all Dr. Dietz's material with him in his hospitable home in Hazelton, Pa., and have had another fruitful sojourn with him in my own home, which has resulted in complete agreement between us on nearly every point of difference in opinion which had arisen during my studies of his paper. Thus I am very gratified that the following corrections of that paper (with a few minor exceptions specially noted) are all seconded by Dr. Deitz, who has shown during our sometimes quite animated discussion a rare scientific spirit in the effort to get at the true facts, regardless of his expressed opinions, which cannot be too highly commended; in fact, Dr Dietz might as well have published the following notes himself, but has preferred that I should do it.

Dr. Dietz deserves very much credit for his painstaking work, which is one of the largest and most important single contributions ever published on our American Microlepidoptera, and which deals with one of the most difficult groups.

When in the following remarks I mainly give attention to the mistakes in the paper, it is not for lack of appreciation of the good work done or of the many difficulties conquered; but the mistakes should, of course, be corrected; these arise mainly from the lack of sufficient material, and are quite excusable, considering Dr. Dietz's disadvantages in working away from the type collections, and without an adequate library.

One very serious drawback to the paper, which Dr. Dietz cannot be held responsible for, is the fearful amount of typographical errors, worse than in any scientific paper I have met with, which cause much annoyance in study, and result in several unintentional additions to the synonymy.

Dr. Dietz's paper covers a group of moths, which may be shortly defined by our popular name for the paper, "Tinea and allies," and which is equivalent to Heinemann's old family *Tineidæ*; but the limits are rather

1. Trans. Amer. Ent. Soc. Phil., XXXI, pp. 1–95, 1905.

arbitrarily drawn, as, for example, by the exclusion of the genera *Prodoxus* and *Tegeticula*, which naturally belong to this group.

Dr. Dietz divides these insects into two subfamilies: the *Amydriinæ* and the *Tineinæ;* it would, in my opinion, have proved more rational and profitable to have carried through Lord Walsingham's suggested three divisions of the group: *Setomorphinæ*, *Euplacaminæ* and *Tineinæ*,[2] and I believe these groups will eventually stand; but there is at least a question of the propriety of substituting the new name *Amydriinæ* for Lord Walsingham's name, instead of enlarging the conception of the already established subfamily so as to include *Amydria*.

Dr. Dietz says: "These two subfamilies are distinct and sharply defined," but not one nor any combination of the characters given by him hold good; on the contrary, the differences given in the synoptic table are very vague indeed, when critically examined:

1. *Head* rough-haired or almost entirely smooth-scaled.	1. *Head* entirely rough-haired.
2. *Tongue* and *maxillary palpi* rudimentary.	2. Maxillary palpi well developed, very rarely rudimentary. (Tongue not mentioned.)
3. Labial palpi strongly developed, porrect and more or less ascending; second joint with a brush, more or less developed, or simply thickened with scales beneath; terminal joint pointed, erect, or rarely obtuse and depressed.	3. (Labial palpi not mentioned.)
4. Vein 7 of fore wing to costa or rarely to apex.	4. Vein 7 of fore wing to costa.
5. Vein 1*b* furcate at base.	5. (Vein 1*b* not mentioned.)
6. Hind wings as wide as fore wings.	6. (Width of wings not mentioned.)
7. Vein 1*b* more or less distinctly furcate at base.	7. Vein 1*b* simple at base (except Brackenridgia).
8. Vein 1*e* always distinct.	8. Vein 1*e* often absent.

In other words, he separates the two subfamilies "on one character apparently overlooked" (sic!), namely, the furcation of vein 1*b* of the

2. Trans. Ent. Soc. Lond., p. 81, 1891.

hind wings, which he himself admits occurs in one genus of *Tineina (Brackenridgia)*,[3] and which I find also in *Greya* and in *Cyane*, which belong to *Tineina*, according to Dietz.

In his first group Dr. Dietz places nine genera, of which, however, his genus *Semiota* is established on the male forms of Zeller's genus, *Setomorpha*, as shown by the writer,[4] and his genus *Apotomia* is likewise (Dietz concurring) only the male form of *Setomorpha*; both must consequently fall as synonyms of Zeller's genus.

This leaves seven genera, of which the first three, *Amydria*, *Hypoplesia*[5] (*Paraplesia*, Dietz, preoccupied) and *Paraneura* form one group (the *Euplacaminæ* of Walsingham), in which the two last genera, *Epichæta* and *Apreta*, probably should be included,[6] while the two remaining *Epilegis* and *Setomorpha* form another group (the *Setomorphinæ* of Walsingham).

Coming down to the species, I believe, from my examination of the too scant type material, that *Amydria curvistrigella*, *pandurella* and *confusella* are only slight variations of *apachella*, and should go into the synonymy.[7] The species described as *Setomorpha sigmoidella* is not a true *Setomorpha*, but may be retained in that genus until more material is on hand; it will form a new genus. *Setomorpha majorella* is a good female *Setomorpha* species, and evidently (Dietz concurring) the same as *Semiota transversostrigella*, described from the male; the latter name will thus fall as a synonym.

In the second subfamily *Tineina*, Dr. Dietz includes twenty-two genera, of which six are new; all will probably prove valid.[8] Much credit is due Dr. Dietz for bringing order out of the chaos in which our American species of this group were found.

I am able to make the following corrections and additions:

In *Xylesthia* Dr. Dietz has rightly adopted my conclusion[9] that the three names given by Clemens, Zeller and Chambers all apply to the same

3. *Paraclemensia*, Busck, Journ. N. Y. Ent. Soc., XII, No. 3, 1904.

4. Proc. U. S. N. Mus., Vol. 30, p. 734, 1906.

5. Proc. U. S. N. Mus., Vol. 30, p. 735, 1906.

6. The material at present available is too scant to express absolute opinions on.

7. Dr. Dietz does not think so.

8. I have not yet, however, had opportunity to critically compare the new genera with existing exotic genera.

9. Proc. Wash. Ent. Soc., 5, p. 186, 1903.

species in various conditions of imperfection, but he nevertheless makes a fourth name for what is in my opinion undoubtedly[10] the same insect in another degree of imperfection, and calls it "very distinct"; his *Kearfottella* is nothing but *pruniramiella*, Clemens.

Abacobia carbonella, Dietz, is the species described by Walker as *Tinea Martinella*, as my examination of Walker's type in the British Museum proved, and this very interesting form, which has a wide distribution, should be known as *Dietzia Martinella*, Walker, Dr. Dietz's generic name being preoccupied.[11] *Tinea afflictella*, Walker, is the female of this same species, as the unique type in the British Museum shows.

The present American conception of the genus *Incurvaria*, as expressed in our list and in Dr. Dietz's paper, is not equivalent to the European conception as defined by Meyrick,[12] but is rather *Lampronia*, Stephens; much more abundant material than at present at our command is required to properly straighten out this group.

Incurvaria rheumapterella, Dietz, is the well-known *Prodoxus coloradensis*, Riley, as is at once evident from Dietz's figure alone, and examination of the type verifies this.

Brackenridgia, Busck, should be *Paraclemensia*, Busck.[13]

The venation of the hind wing of the genus *Isocorypha* is wrongly given, both in the text and in the figure; the hind wing is quite normal, and has eight veins all separate, vein 8 *not* connected with the cell.

In describing his new species, *crysocomella*, and in including it in this genus, Dr. Dietz has been inexplicably careless; the species has but the most superficial resemblance to the type-species, and does not even belong to the same family, but is an *Ethmia*, and the same as the species described by Lord Walsingham as *albistrigella;* Dr. Dietz's type is in very poor condition, but amply proves the synonymy.

The preoccupied name *Progona* has been substituted by *Mea*, Busck.[14]

Tinea costitristrigella, Chambers, seems to be omitted altogether.

10. Dr. Dietz not concurring.

11. Busck, Proc. U. S. N. Mus., Vol. 30, p. 735, 1906.

12. Handbook Br. Lep., p. 779, 1895.

13. Journ. N. Y. Ent. Soc., Vol. XII, No. 3, 1904.

14. Proc. U. S. N. Mus., Vol. 30, p. 735, 1906.

POPULAR AND PRACTICAL ENTOMOLOGY.—NO. 17.

The Locust Mite.

BY T. D. JARVIS, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

During the past summer the Locust Mite (*Trombidium locustarum*, Riley) has been very common at Guelph, especially on the Red-legged Locust (*Melanoplus femur rubrum*), but a few specimens have also been found upon the Two-striped Locust (*Melanoplus bivittatus*). The mite is most generally found attached to the base of the second pair of wings, although it is also found on the wing itself, and on any other part of the body where it cannot be readily detached by the locust; a favourite position upon the body is between the segments of the thorax and abdomen, and also behind the upper joints of the legs; in such position their only means of attachment to their host is apparently by their mandibles.

The young mites (fig. 46, *b*) are nearly spherical, and look very much like the eggs of insects. The mite sucks the blood of its host until it

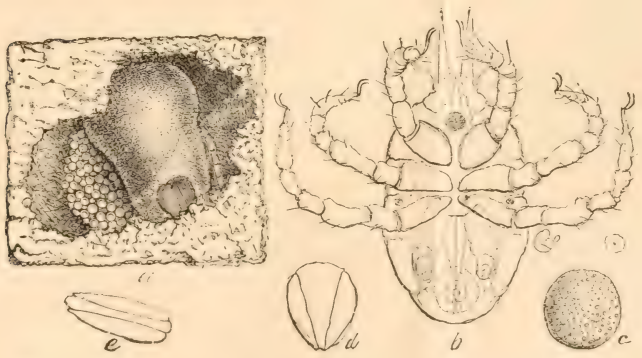

FIG. 46.—TROMBIDIUM LOCUSTARUM.—(*a*) female with her batch of eggs; (*b*) newly-hatched larva—natural size shown by the dot in a circle on the right; (*c*) egg; (*d*, *e*) empty egg-shells (after Riley).

reaches maturity, during which time it often becomes so swollen with food that its legs are rendered very inconspicuous. As many as five of these young larvæ have been found upon a single locust.

October, 1906.

The adult mite (fig. 47, *c, d*) is of a bright crimson colour and about one-eighteenth of an inch long. When full-grown it passes to the ground,

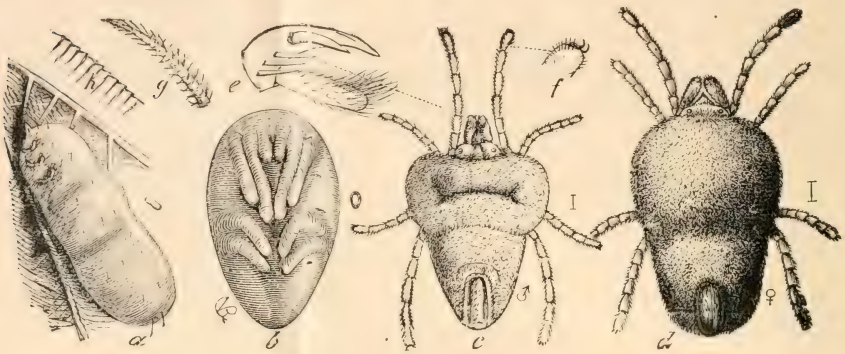

FIG. 47.—TROMBIDIUM LOCUSTARUM.—*(a)* mature larva, when about to leave the wing of a locust; *(b)* pupa; *(c)* male adult fresh from the pupa; *(d)* female—the natural sizes are indicated by the short lines on the right; *(e)* palpal claw and thumb; *(f)* pedal claws; *(g)* a barbed hair; *(h)* the striations on larval skin (after Riley).

where it remains over winter. Dr. Riley, who has studied the life-history of this mite, states that the eggs are laid an inch or so under the ground in clusters containing between 200 and 400. Early in the spring from these eggs emerge the young mites, which, upon reaching the surface of the ground, attach themselves to their hosts. These little mites render good service in checking the spread of the locusts, as almost every locust upon which one is found appears to be more feeble and sickly than those which have not been attacked.

THE ANNUAL MEETING of the Entomological Society of Ontario will be held at the Agricultural College, Guelph, on Wednesday and Thursday, the 10th and 11th of October. Mr. W. D. Kearfott, of Montclair, N. J., is expected to be present, as well as other members from a distance.

CHANGE OF ADDRESS.

All correspondence, books, exchanges, etc., for the Entomological Society of Ontario or the CANADIAN ENTOMOLOGIST, should in future be addressed to

GUELPH, ONTARIO, CANADA,

and not, as heretofore, to London, Ontario.

DESCRIPTION OF A NEW SPECIES OF SAW-FLY.

BY WARREN T. CLARKE, AUBURN, ALABAMA.

Dolerus Cookei, n. sp.—Female.—Length, 4 to 4.5 mm. Expanse of wings from tip to tip, 8 to 9 mm. General colour effect of body dark brown to black. Head back of, about and beneath ocelli, black, sparsely clothed with whitish hairs. Clypeus sinuate, incurved, yellow, sparsely pilose. Labrum polished yellow. Antennæ dark brown to black, stout, pilose. Joints i and ii subequal, short; rest subequal, longer. Antennal foveæ circular, deep. Thorax: tergum black, sparsely clothed with whitish hairs; pleura and venter polished black. Wings smoky brown; first submarginal cell irregular oblong; veins dark brown to black. No clear spot at base of wings. Legs yellow, shading to brown; tibial spur not bifid, yellow. Abdomen stout, black, sparsely pilose. Saw yellowish, marked with dark brown, sheath black.

Male.—Length, 3 to 3.5 mm. Expanse of wings from tip to tip, 7 to 7.5 mm. General colour effect of body yellow. Head back of, about and beneath ocelli, polished yellow, sparsely clothed with white hairs. Clypeus sinuate, incurved, yellow, slightly pilose. Labrum polished yellow. Antennæ stout, yellow, joints i and ii subequal, short; rest subequal, longer. Antennal foveæ circular, deep. Thorax: tergum dark brown, clothed with white hairs. Pleura and venter polished yellow. Wings hyaline, veins yellow-brown. First submarginal cell irregular oblong; no clear spot at base of wing. Legs yellow; tibial spur not bifid, yellow. Abdomen medium slender. Tergum and pleura dark brown, marked with yellow; venter yellow; all slightly pilose.

Habitat, California.

The sexes are readily separable by the colour and size dimorphism shown in the species. The insects are single-brooded, the eggs being placed in the tissue of the calyx ring or sheath of the cherry and plum blossom, just beneath the outer epidermis. Incubation is accomplished in from five to seven days, the young larvæ boring into the newly forming fruit and devouring the embryo. The larvæ attain their full growth in from 21 to 25 days, being then about seven millimeters in length. They then pass down to and into the ground beneath the trees, there forming small cells, in which pupation takes place later on. In the following spring the adult insect appears, and the cycle is completed.

This species can be distinguished from the other species of *Dolerus* known in California by the following table:

More than 9 mm. in length.

Clypeus notched.....*coccinifera.*
Clypeus sinuate.....*Tejonensis.*

Less than 9 mm. in length.

Head and thorax coarsely punctured or pitted.....*distinctus.*
Head and thorax not coarsely punctured or pitted.....*Cookei.*

This insect *(D. Cookei)* was first noted in the larval form about the year 1883 by the late Matthew Cooke, then Chief Executive Horticultural officer of the State of California. Specimens of the larvæ were determined by him to belong to the family Tenthredinidæ. Cooke's work with the insect in question went no further than this, no adults being examined by him (see "Injurious Insects of the Vineyard, Orchard, etc.," pp. 137–138, Sacramento, 1883). During the spring and early summer of the years 1905 and 1906 it became the writer's duty to make a field study of this insect in the Suisun valley, California, and this paper records certain of the observations then made.

BOOK NOTICE.

"Boulder Reveries."—By W. S. Blatchley. The Nature Publishing Co., Indianapolis.

This volume is made up of extracts from the diary of one who is in sympathy with nature as she reveals herself by the wayside, in neglected wood-lots, in purling stream, on the rugged hillside, or by the desolate lake shore. The environment peculiar to these places in the summer and autumn seasons envelops the reader as his mind meanders leisurely over its pages. The book does not call for ardent study, but simply for an occasional perusal at times when the mind is jaded by the common cares of life, and when it is impossible for one to get out with nature herself in order to realize at first hand the refreshing influence of her perennially soothing, strengthening and uplifting powers. No stirring flights of the imagination are provided, but nature as she is seen by the appreciative observer of insect, plant and animal life, of sunshine bright, and cooling showers, is presented to the mind's eye by one who could never be lonesome in lonely places.

"Aug. 17, 1902.—How beautiful the green livery of nature in the country on these mid-August days! The many rains of the season have enhanced the depth of that green, have clothed the face of the earth in her most luxuriant garb. Peace, calm, quietude; here, if anywhere, they reign! Not even the droning of a bumblebee breaks the quiet of the Sabbath morn." This is a typical paragraph from the "Reveries."

D. H. J.

Mailed October 4th, 1906.

The Canadian Entomologist.

VOL. XXXVIII. LONDON, NOVEMBER, 1906. No. 11

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-third annual meeting of the Society was held in its new quarters at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, October 10th and 11th. The chair was taken by the Vice-President, Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms. Among those present were Mr. John D. Evans, Trenton, the retiring President; Mr. Henry H. Lyman, Montreal; Mr. Arthur Gibson, Central Experimental Farm, Ottawa; Mr. C. H. Young, Hurdman's Bridge; Dr. Brodie, and Messrs. C. W. Nash, J. B. Williams and Paul Hahn, Toronto; Mr. G. E. Fisher, Burlington; Mr. J. Fred. Smith, San José Scale Inspector for Ontario; President Creelman, Professors Hutt, McCready and Bethune, Messrs. Jarvis, Eastham, Howitt, Zavitz and Peart, of the Ontario Agricultural College, and a large number of students from both the College and the Macdonald Institute. Owing to the lateness of the train from the east, there was only time for a very brief business meeting of the Council.

In the afternoon the proceedings began with a discussion on the Codling-worm, and, owing to the large attendance, over a hundred being present, the meeting was held in the spacious Massey Hall. Dr. Fletcher, the chairman, opened the debate by giving an outline of the life-history of the insect, the extent of its ravages and the ordinary methods of dealing with it. Dr. Brodie read a paper, in which he recounted the early history of the insect in Ontario, and described his efforts to rear its parasites and the difficulties he had to encounter in studying them and their host. The discussion was participated in by Prof. Hutt, Messrs. Nash, Fisher, Jarvis, Peart, Zavitz, Crow, Cæsar, and Prof. Bethune. The remainder of the afternoon was occupied with the reading of the reports of the Directors on the Insects of the Year in their respective districts.

In the evening, notwithstanding the inclemency of the weather, Massey Hall was nearly filled with an appreciative audience. The chairman, in opening the proceedings, spoke of the new home the Society had acquired, and congratulated the members on the excellent arrangements that have been made for its library and collections by the authorities of the Ontario Agricultural College. President Creelman gave a

warm and hearty welcome to the Society, and expressed the pleasure that he and all connected with the College felt in having its headquarters in their midst; he was especially gratified that the chairman had described their new quarters as "home," and trusted that it would be their home for many a year to come; he also placed at their disposal everything that the College could offer for their comfort and convenience. Mr. Evans then read his annual presidential address, and Prof. McCready read a paper by Prof. Lochhead, of the new Macdonald College at Ste. Anne de Bellevue, who was unavoidably prevented from being present, on "What the Entomological Society can do for the Ontario Agricultural College." These were followed by a description of a canoe trip for entomological purposes in the Algonquin Park, illustrated with lantern slides from original photographs, by Mr. Paul Hahn, of Toronto. The proceedings were much enlivened by musical selections, both vocal and instrumental, furnished by the College Philharmonic Society.

During the second day, Thursday, Oct. 11th, meetings were held both morning and afternoon in the Entomological Lecture-room in the Biological Building, and were largely attended by students and others. Papers were read by Dr. Brodie, on "A Snout-beetle *(Balaninus nasicus)*"; by Mr. T. D. Jarvis, on "Gall Insects," illustrated with lantern pictures and an immense number of specimens; by Mr. Lyman, on "A hunt for a borer *(Gortyna)*"; by Mr. Zavitz, on "Forest Insects," and were discussed by many of the members present. The reports of the Council, Officers and Branches were also presented and read. During the afternoon an important discussion, opened by Mr. J. Fred. Smith, took place on the question whether restrictive measures should be taken to prevent the sale of fruit attacked by the San José scale. A good deal of difference of opinion was expressed regarding the danger of introducing the scale into new districts by the agency of infested fruit, but the unanimous conclusion was that no restrictions ought to be imposed upon such an important industry until it could be fully established that the danger really existed. During the meetings a large number of beautiful and interesting specimens were exhibited by the members, those brought by Mr. Young being especially noteworthy. A full account of the discussions and the papers presented will be published in the forthcoming annual report to the Legislature of Ontario.

The election of officers for the ensuing year resulted as follows:

President—Dr. James Fletcher, LL.D., F.R.S.C., F.L.S., Ottawa.

Vice-President—Tennyson D. Jarvis, B.S.A., Ontario Agricultural College, Guelph.

Secretary—E. J. Zavitz, B.S.A., O. A. College, Guelph.

Treasurer—Prof. S. B. McCready, B.A., O. A. College and Macdonald Institute, Guelph.

Librarian—Rev. Prof. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., O. A. College, Guelph.

Curator—J. E. Howitt, B.S.A., O. A. College, Guelph.

Directors: Division 1, Ottawa—C. H. Young, Hurdman's Bridge.
" 2, Midland—C. E. Grant, Orillia.
" 3, Toronto—J. B. Williams, Toronto.
" 4, York—C. W. Nash, Toronto.
" 5, Niagara—G. E. Fisher, Burlington.
" 6, London—J. A. Balkwill, London.

Ex-officio Directors—All the ex-presidents of the Society.

Delegate to the Royal Society—A. F. Winn, Montreal.

Editor of THE CANADIAN ENTOMOLOGIST—Rev. Prof. Bethune.

Auditors—B. Barlow and H. S. Peart, O. A. College, Guelph.

TO ALL INTERESTED IN ENTOMOLOGY.

The initial meeting of the Entomological Society of America will be held in New York City in connection with the midwinter meetings of the American Association for the Advancement of Science.

This Society has been organized to meet the need of a national entomological society, which shall represent all departments of entomology, and which shall hold a place in American entomology similar to that held in their respective countries by the great foreign entomological societies.

It is hoped that this movement will have the co-operation of all the existing entomological societies in this country, and that it will in no way interfere with the success of any of them. It is believed that a strong national society, which shall bring together workers in all fields of entomology, will tend to broaden the interests of each, and to strengthen the more special or local societies.

The amount of entomological work that is being done in the United States and Canada is great compared with what is being done in any other country; it is fitting, therefore, that the workers in this field should be united in a national society.

On another page there is given the report of the committee on organization ; and an invitation is hereby extended to every one interested in entomology to join the society. Applications for membership may be addressed to Prof. J. H. Comstock, Ithaca, New York.

THE ENTOMOLOGICAL SOCIETY OF AMERICA.

A meeting of the committee to organize a national entomological society, for which provision was made at the Philadelphia meeting of the Entomological Club of the A. A. A. S., was held June 28, 1906, in the Entomological Laboratory of Cornell University. The New York Entomological Society was represented by Mr. Carl Schæffer, the Chicago Entomological Society by Dr. James G. Needham, the Jugatæ (the Ithaca Society) by Professor J. H. Comstock, the Newark Entomological Society by Mr. J. A. Grossbeck, the Entomological Society of Ontario by Rev. Professor C. J. S. Bethune, and the American Entomological Society by Mr. J. Chester Bradley. At an adjourned meeting the Washington Entomological Society was represented by Mr. E. S. G. Titus.

The committee was organized by the appointment of Professor Comstock as chairman and Mr. Bradley as secretary.

The secretary then stated in brief the history of the present movement for the organization of a national entomological society. The parts of Mr. Lyman's two presidential addresses dealing with the organization of an entomological union were read and discussed. Discussion then followed as to the purpose for which such a society should exist, and as to whether there was need for one. The opinion that there was such a need seemed to prevail, but it was urged that if the society be formed it should be based on broad and comprehensive grounds. It was then moved that it is the sense of this committee that the organization of a national entomological society is desirable. Every member in turn was called upon for an expression of opinion, and every one spoke in favour of the organization ; but it was the feeling of the committee that the success of such a society would depend on the securing of co-operation of other societies, as the Association of Economic Entomologists and the Entomological Club of the A. A. A. S.

It was suggested that provision might advantageously be made for committees on policy, as on education, on legislation, on museum methods, and on nomenclature.

Strong opposition was made to the formation of any independent code for entomologists ; but it was believed that a committee on nomenclature might have legitimate ground for existence in voicing the peculiar needs of entomology in matters of nomenclature and in securing their adequate representation in the International Zoological Congress.

A sub-committee was appointed to draft a constitution and by-laws, which should embody the decisions reached by the committee, and to report them at an adjourned meeting.

The committee then discussed membership, dues, officers, elections and other matters. The decisions concerning these were subsequently embodied in the constitution and by-laws. The committee then adjourned until the following day.

At an adjourned meeting, held June 29, 1906, the report of the sub-committee on constitution and by-laws was read and discussed. After the making of some changes, the report was adopted, and the sub-committee was authorized to prepare and have printed a report of the committee, together with the constitution and by-laws, and to send them, with an invitation to be present at the initial meeting of the society, to every entomologist in the country whose address could be learned, and to have them published in the entomological journals. The sub-committee was also authorized to call an initial meeting in New York City in connection with the midwinter meetings of the A. A. A. S., to make arrangements for that meeting, and to transact such other business as may be necessary.

At a second adjourned meeting, held June 30, 1906, it was decided to apply at once for affiliation with the American Association for the Advancement of Science, and such application was subsequently made.

J. Chester Bradley, Secretary.

THE ENTOMOLOGICAL SOCIETY OF AMERICA.

CONSTITUTION.

Article I.

NAME.

Section 1. This organization shall be known as The Entomological Society of America.

Article II.

OBJECTS.

Section 1. It shall be the purpose of this society to promote the science of entomology in all its branches, to secure co-operation in all

measures tending to that end, and to facilitate personal intercourse between entomologists.

Article III.

MEMBERSHIP.

Section 1. The active membership of this society shall consist of two classes: *Members* and *Fellows*.

Section 2. All persons interested in entomology shall be eligible to membership.

Section 3. Members who have contributed to the science of entomology in some important way may be elected Fellows of the society. The number of Fellows shall not exceed fifty at any time.

Article IV.

OFFICERS.

Section 1. The officers of the society shall be a president, two vice-presidents and a secretary-treasurer. The duties of these officers shall be those usually pertaining to their respective offices.

Section 2. The business of the society not otherwise provided for shall be in the hands of an executive committee, consisting of the officers named in Section 1 and six additional members, who shall be elected by the society. Four members of the committee shall constitute a quorum.

Section 3. The president shall represent the society upon the Council of the American Association for the Advancement of Science.*

Article V.

ELECTIONS.

Section 1. Election of Members. Nominations for membership may be made by any two members, and election shall be by the Executive Committee.

Section 2. Election of Fellows. All nominations for fellows shall be signed by three or more members or fellows, and each nomination shall be accompanied by the following information concerning the nominee: Name, address, occupation, branches of entomology engaged in, positions held involving entomological experience, entomological work done, and list of publications.

Election shall be by ballot at the annual meeting, upon nominations approved by the Executive Committee. Ballot may also be taken upon such other nominations, previously sent to the Executive Committee, as may be demanded by any five members or fellows. All elections of fellows shall require a two-thirds vote of the members present.

*This section was adopted provisionally; it is to be included if affiliation with A. A. A. S. be granted.

SECTION 3. All officers shall be elected by ballot at the annual meeting, for a term of one year, and shall be eligible for re-election.

ARTICLE VI.

MEETINGS.

SECTION 1. An annual meeting shall be held at such time and place as the Executive Committee each year may select.

ARTICLE VII.

AMENDMENTS.

SECTION 1. This constitution may be altered or amended at any annual meeting by a two-thirds vote of the members present, a copy of each amendment proposed having been sent to members and fellows at least one month in advance of the meeting.

BY-LAWS.

1. The annual dues for members and fellows shall be one dollar.

2. A majority of the members present at an annual meeting shall constitute a quorum for the transaction of business.

3. Notice of all meetings of the society shall be sent to members at least one month in advance.

4. The Executive Committee shall provide a programme for all meetings, including at the annual meeting, a popular lecture, and a technical entomological exhibit of material and methods.

5. The time of the business meeting shall be published prior to the opening session of the annual meeting.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The first regular meeting of the autumn and winter season was held in the Biological lecture room of the Ontario Agricultural College on Wednesday evening, October 17th. Mr. T. D. Jarvis, Vice-President, occupied the chair. The proceedings began with notes and observations made by members during the past summer.

Prof. Bethune exhibited mounted specimens, showing the life-history and work of the two Asparagus beetles, *Crioceris asparagi* and *12-punctatus*, the former of which feeds on the foliage, and the latter on the seeds of the plant. He described the steady advance of these insects in a westerly direction. *C. asparagi*, the blue species, he had never seen alive till this year, though it is now very abundant in the College garden ; the spotted species has been familiar about London for three or four years, and seems to be a few years in advance of its companion in its spread

over the country. Spraying with a mixture of lime and Paris green is an effective remedy ; when the shoots are being cut for table use lime alone should be used.

Mr. E. J. Zavitz, Secretary of the Society, gave some interesting notes on a rare species of forest insect belonging to the Ptinidæ, *Dinoderus substriatus*, Payk., which he had found injuring the bark of Hemlock trees.

Mr. J. Eaton Howitt related his observations of a beetle attacking the fruit of an almond, which had been furnished by a grocer in Guelph. The insect is probably a Southern importation brought with the nuts. Further examination will be made, and the results reported at a future meeting.

Mr. H. Groh gave an account of the depredations of the gray Blister-beetle, *Epicauta cinerea*, which he had found feeding upon alfalfa and other leguminous plants. The insect appeared in very large numbers, and disappeared very suddenly.

Mr. L. Caesar gave an interesting account of the work of Aphis-lions, *Chrysopa*, and Assassin-bugs, *Reduviidæ*, in reducing the numbers of the Pear-tree Psylla, which was doing much damage in an orchard in the Niagara district. What at first portended a serious injury to the trees was entirely got rid of through the friendly aid of these carnivorous insects.

After these observations had been discussed, Prof. Bethune read a paper by Mr. J. Chester Bradley, of Cornell University, on "An Entomological Trip to the Selkirk Mountains of British Columbia," illustrated with a series of original lantern pictures. This paper was intended for the annual meeting, but the slides, unfortunately, did not arrive in time for its presentation then.

There were thirty-four present during the evening, including some of the lady teachers belonging to the Nature-study class at the Macdonald Institute. Meetings will be regularly held on each alternate Wednesday evening, the Wellington Field Naturalists' Club holding its meetings on the intervening Wednesdays.

ENTOMOLOGICAL MEETINGS AT BATON ROUGE, LA.

The Association of Official Entomologists of the Cotton Belt will meet at Baton Rouge, Louisiana, Nov. 13 and 14, 1906.

The Association of Farmers' Institute Workers will meet at Baton Rouge, Nov. 12 and 13 ; the Association of Official Horticultural Inspectors, Nov. 14, 15 and 16, and the Association of Agricultural Colleges and Experiment Stations, Nov. 14, 15 and 16.

The above date is, therefore, a most convenient time at which to hold a meeting of the Southern entomologists, owing to the interesting programme offered by the various other societies meeting at Baton Rouge during the same week, and owing to the low rates which will then be in effect on all railroads.

The unprecedented advance into new territory made by the boll weevil in its migrations this year, the modifications of quarantines made by several of the Southern States, and the new developments with reference to the boll weevil situation, notably the results of investigations by the Bureau of Entomology with reference to the parasitism of this pest by native parasites, insure an interesting and highly instructive session. A recapitulation of the situation and of recent investigations cannot prove other than of value to every Southern entomologist.

A problem of even greater importance to Southern agriculture than that of the boll weevil, is the problem of eradicating the Texas fever Cattle-tick. Preparations are gradually being made by the Southern States, in co-operation with the U. S. Dept. of Agriculture, to presently commence the entire eradication of this pest from the United States. The Cattle-tick presents what is undoubtedly the first case in which total eradication of a pest appears both possible and feasible, and its consideration is therefore of peculiar interest. Prof. H. A. Morgan, whose studies of the life-history of the Cattle-tick made possible the practical development of eradication methods, is expected to be present at the meeting of Cotton Belt entomologists, and give a comprehensive resume of this line of entomological work. Officials of various Southern States, as well as representatives of the U. S. Dept. of Agriculture, will be present to discuss various phases of this problem, and an interesting symposium upon the tick work is fully assured.

Several excursions to local points of interest are being planned, including excursions to the extensive sugar-cane plantations, sugar house and refineries surrounding the city.

Members of the Association of Economic Entomologists, as well as others who may be interested in entomological work in the South, are cordially invited to attend and participate in these meetings.

Kindly advise Mr. Wilmon Newell, Baton Rouge, La., at an early date, as to whether or not you will be in attendance, in order that provision may be made for the ample accommodation of all visitors.

A. W. Morrill, Secretary,
Association of Official Entomologists of the Cotton Belt.

A NEW RETINIA ATTACKING AUSTRIAN PINE.

BY A. COSENS, JAMIESON AVE. COLLEGIATE INSTITUTE, TORONTO.

Retinia Austriana, n. sp.—The Austrian Pine *(Pinus laricio Austriaca)* in the vicinity of Toronto is badly infested by the larvæ of a moth which is apparently an undescribed species of the genus *Retinia*. It resembles in certain particulars the form *Retinia Comstockiana*. This species was described in the CANADIAN ENTOMOLOGIST of Aug., 1879, by Prof. C. H. Fernald, State College, Orono, Me. The specimens, however, were obtained at Ithaca, N. Y., where they were found boring in the small branches of *Pinus rigida*.

The Toronto species burrows in the cortical layer of the Austrian Pine. The tunnels formed pierce the resin ducts, the gum exudes and hardens into masses on the bark of the trees. The point of attack appears to be usually beneath the origin of a limb. The larvæ work on a more or less horizontal plane, and in consequence of this the trees have been, in some cases, almost girdled.

This form also resembles *R. Comstockiana* in its life-history. The larva when mature burrows into the lump of resin that has hardened over the entrance to its tunnel, and there pupates. The thin covering of gum left over the burrow is broken through by the imago when it emerges.

The larva prepares its burrow in the lump of resin in a very characteristic manner. Two larvæ were placed on a mass of the gum, and in a remarkably short time they had sheltered themselves in it. Their mode of operation was as follows: Selecting an accidental crevice in the resin, they crawled into it, and immediately began to weave threads of silk across the opening. The burrow was then enlarged by biting off pieces of the gum. The little masses broken off were disposed of by being forced against the covering of silk threads until they adhered to it. This very soon so effectually closed the burrow as to make it a matter of some difficulty to find its location. This closing of the burrow, when done under natural conditions, may be a means of preventing further exudation of resin. In all the cases examined the tunnel appeared to be quite open for some distance behind the pupa.

In High Park, Toronto, nearly all the Austrian Pines are infested. In all cases the trees are being materially injured, and in some cases have been killed. Trees of the same species in other Toronto localities have been found to be infested.

The ravages of this moth are checked by parasitic agency to a certain extent, as an Ichneumon Fly emerged from a mass of resin collected by the writer.

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Retinia Austriana, n. sp.—Larva: Length, 15–16 mm. Whitish, with a slightly silvery lustre. The last segment marked with dark spots on the dorsal surface. A few fine hairs on each segment of the body. Body wall very transparent.

Pupa: Length, 13–15 mm. Light brown in colour.

Imago: ♀.—Expanse, 20–22 mm.

Head: Brown, flecked with a few white silvery scales. Antennæ brown, each joint marked above with the silvery-white scales. Basal joints silvery-white above. Palpi dark brown, mottled with a few white scales. Eyes a lighter brown than the head. The scales project in the form of a ruff at the origin of the head. This is especially well marked on the dorsal surface.

Thorax: Above dark brown, shading into a lighter silvery-brown anteriorly. Beneath a mottled white and brown, with a silvery lustre, the white slightly predominating.

Abdomen: Above light brown, with a silvery lustre, each segment ending with a narrow band of silvery white scales. Beneath the white and brownish scales are about equally mixed. Towards the posterior end of the segments the white scales are slightly predominant. Anal tuft light brown.

Legs: The femora and tibiæ of the two anterior pairs dark brown, mottled with silvery-white scales. Tarsi dark brown, each segment ending in a ring of silvery-white. The femora and tibiæ of the posterior pair are silvery-white, flecked with a few brownish scales. Tarsi lighter in colour than in the two anterior pairs.

Wings: Fore wings above light silvery brown, mottled with silvery white. A wide irregular band of dark brown, interspersed with a few white scales, runs along the entire costal edge, while a narrow edging of dark brown bounds the outer margin. Two wavy bands of whitish silvery scales pass across each wing at nearly right angles to the costa, and divide the wing into three nearly equal parts. These bands are margined with dark brown. The distal third of the wing shades off into whitish, where it is bounded by the dark band on the outer margin of the wing. Beneath these wings are a light silvery-brown, shading into a little darker at the costal and outer margins. The markings of the upper surface do not show through. The fringe of these wings is a light brown, with a silvery lustre. The colour is slightly lighter at the tips.

Hind Wings: Above white, with a decided silvery lustre. An irregular band of light brown along the costal margin, while a narrow line

of silvery light brown bounds the outer margin. Beneath as above, but the brown edgings are not so pronounced. The fringe is silvery-white, shading into light brown along the line of attachment opposite the brown line on the outer margin of the wing. The fringe on the distal margin is light brown.

SOME CARPENTER-BEES FROM AFRICA.

BY T. D. A. COCKERELL, BOULDER, COLO.

I am indebted to Dr. F. Creighton Wellman for specimens of two little-known species of Xylocopidæ, collected by himself in Angola. Although they are not new species, they suggest a few observations.

Mesotrichia mixta (Radoszkowski, 1881).

Two females, Chyaka, Angola, July, 1906, on mountain side, 6,000 feet. Dr. Wellman says: "Seen at several flowers. These taken at a species of *Millettia*, of which they are very fond."

The genus *Mesotrichia* seems sufficiently distinct from *Xylocopa* to be maintained, but I think *Koptorthosoma*, Gribodo, is only a subgenus of it. Ashmead separates *Mesotrichia* from *Koptorthosoma* by the characters, "second cubital cell, along the cubitus, much longer than the first; mandibles tridentate," as well as certain peculiarities of the males. *M. mixta*, however, has the venation of *Mesotrichia*, with the bidentate mandibles of *Koptorthosoma*. Vachal suggests that *M. mixta* may be a variety of *Mesotrichia flavorufa* (*Apis flavorufa*, DeGeer, 1778), but the true *flavorufa* appears to be confined to the eastern side of the continent, and I think *mixta* is certainly a valid species.

Xylocopa tarsata, Smith, 1854, var. *Wellmani*, v. nov., Bailundo, Angola, Feb.–March, 1906, 4,700 feet. "Taken at various Malvaceæ, principally *Gossypium* spp." Both sexes sent. The insect agrees with Smith's brief description, except that it is a little longer, and the hind tibiæ are covered with red hair on the outside (Smith speaks of it as being confined to the apex). The male, not hitherto described, has the clypeus (except the lower margin), a broad supraclypeal mark, and lateral face-marks filling in the space between eyes and clypeus, and ending abruptly at level of antennæ, all bright chrome-yellow. The labrum is black, with a central tubercle. The hind femora are much swollen, and have a large basal tooth, directed downwards, and apicad beneath; the hind trochanters have a large tooth directed backwards over the coxa. The insect is nearly 18 mm. long. Vachal has suggested that *X. albifrons*, Lep., is the male of *tarsata*, but it is quite distinct from the Angola male. Since the Angola insect is not quite the same as true *tarsata* (from the Cape of Good Hope) in the female, and the male is like nothing yet seen in the original locality of *tarsata*, I propose to call Dr. Wellman's insect *X. tarsata Wellmani*.

November, 1906

POPULAR AND PRACTICAL ENTOMOLOGY.—No. 18.

The Bean Weevil (*Bruchus obtectus*, Say).

BY ARTHUR GIBSON, ASSISTANT ENTOMOLOGIST, CENTRAL EXPERIMENTAL FARM, OTTAWA.

An insect which, fortunately, has only been reported on a few occasions as doing damage in Canada, is the Bean Weevil, *Bruchus obtectus*, Say. Authentic instances of injury by this insect have been received from one locality in Ontario, and from two in Quebec. The injury in all cases was to seed beans.

The Bean Weevil (Fig. 48) is a small, hard-shelled beetle, one-tenth of an inch long, oval in form, with the head bent down and more or less concealed, as seen from above, and prolonged into a squarely-cut snout, or beak. Its antennæ are distinctly jointed and enlarged at the tip, the first four joints and the last one reddish. The wing-covers are marked with ten impressed and dotted longitudinal lines, and the whole body is covered with short, silky hairs. The lines on the wing-covers are broken up into pale yellowish dashes and dark brown spots. The tip of the abdomen extends beyond the wing-covers, and is of the same reddish tinge as the tips of the antennæ and the legs, but is covered more or less with short, silky hairs, and bears a central white line, but there is no appearance of the two black spots so conspicuous in the Pea Weevil, which it resembles in shape and movements. Compared more closely with this latter well-known insect, the Bean Weevil is not one-half so large, is more soberly coloured, having less white on the wing-covers, and lacks the white spot on the middle of the hinder part of the thorax, and the two oval black spots mentioned above, which are present on the exposed tip of the abdomen of the Pea Weevil.

Fig. 48.

"The life-history of the Bean Weevil differs in some important points from that of the Pea Weevil. The eggs of both are laid upon the pods while these are young and tender. On hatching, the young grub of the Bean Weevil eats its way inside and penetrates one of the forming beans, several grubs entering a single bean, each one forming for itself a distinct cell. They become full-grown, and change to pupæ in the autumn, and a little later to the perfect beetles. The date of emergence

from the seed depends very much, as in the case of the Pea Weevil, on the temperature in the autumn months; it may be in the late autumn or not until spring; when the seed beans are stored in a warm building, the beetles may emerge at any time through the winter. One of the important differences between the life-histories of the Pea and Bean Weevils is that, whereas in the case of the former the young grubs can only enter the soft green seeds, those of the Bean Weevil can propagate for three or four generations in the dry stored seeds. This fact renders the well-known demestic remedy for the Pea Weevil, of holding over the seed for two years, quite ineffective in the case of the Bean Weevil; that is, if a bag of peas infested with the Pea Weevil were put away for two years, the Pea Weevils would emerge the first spring and die in the bags. But, in the case of a bag of beans infested by the Bean Weevil kept in the same way, the beetles on emerging would at once set to work to lay eggs on the beans. The young grubs when hatched would penetrate the dry seeds and go through all their stages, and this breeding might be repeated as long as the supply of beans lasted. Curiously enough, the Pea Weevil does not bore holes through the paper or cotton bags in which infested seed has been stored, but in the case of the Bean Weevil, such bags are readily perforated and the beetles escape,—frequently, when this happens in houses, as is sometimes the case, to the great consternation of the inhabitants." (Fletcher, Bull. 52, Cent. Exp. Farm, Ottawa.)

In the United States the Bean Weevil has been known for a great many years. It was first found injuring cultivated beans in America in 1860, near Providence, Rhode Island. Since then it has become widespread in distribution in that country, and has done a considerable amount of damage. At first it was considered to be a native species, but it is now thought that the original home of the insect was in Asia, and that it was introduced into America through commerce. The first record of injury done by the Bean Weevil in Canada was in 1898, in Middlesex County, Ontario, and since then two further instances of loss from the ravages of this insect have been reported from Quebec Province. Quite recently the writer heard of the presence of the Bean Weevil at Guelph, Ont., in beans imported for seed from the United States. [It has also been reported from Aurora, Ont.—Ed. C. E.]

The Bean Weevil shown herewith is only about half the size of the Pea Weevil, but resembles it in general appearance. The best remedy

for both of these insects is fumigation with bisulphide of carbon. The most convenient way to fumigate is to place the seed in an ordinary coal-oil barrel, and pour on to it one ounce of the bisulphide of carbon for every 100 pounds o grain, then close the barrel tightly, first with a wet canvas or cloth, and on the top of this boards, which should be left undisturbed for at least two days.

MOSQUITO NOTES.—No. 5.

BY C. S. LUDLOW, M. SC.,
Laboratory of the Office of the Surgeon-General, U. S. Army, Washington, D. C.

From the Island of Mindanao, P. I., comes a very pretty mosquito.

Toxorhynchites argenteotarsis, n. sp.— ♀. Head densely covered with very dark brown flat scales, with bronze-blue iridescence, a light blue-white band around the eyes, and a few brown bristles; antennæ dark brown, the basal joint densely covered with flat white scales; palpi with very dark brown, almost black, scales, bronze-blue iridescence, the penultimate and antipenultimate joints with narrow violet apical bands; proboscis very dark, practically black, with bright bronze-blue iridescence; eyes black, clypeus black.

Thorax brown; prothoracic lobes well covered with flat spatulate light greenish-blue, almost white, scales, and a row of brown bristles; mesothorax with bronze-brown spindle-shaped scales on the centre of the dorsum, and a broad border of light blue-green flat spatulate scales running nearly all the way around the mesothorax, the scales just cephalad of the scutellum being also of this character; a bunch of deep orange, or orange-brown bristles over the wing joint, a bare space just dorsad of the pleura extending from the prothoracic lobes to the wing joint; scutellum covered with small flat and long spatulate green-blue scales, and long dark orange-coloured bristles; pleura brown, rather well covered with white scales; metanotum dark brown.

Abdomen dark brown, covered for the most part with blue-green iridescent flat scales. First segment with blue-green median line, and light yellow scales laterally; second, third and fifth segments with large light yellow lateral spots extending well up on the dorsum; on the fourth the lateral spot is not noticeable from a dorsal view; sixth and seventh are more blue than green, and darker than the preceding segments; the sixth with orange, the seventh with black tufts; the eighth segment is

nearly purple, and has an orange tuft; venter with light yellow scales laterally, and an irregular median dark blue stripe extending the whole length of the abdomen.

Legs: Coxæ and trochanters dark, with brilliant light yellow scales; femora of fore legs light-scaled at base, with dark iridescent scales on the dorsal aspect for the distal two-thirds of its length; femora of mid-legs dark; femora of hind legs light for the proximal two-thirds, all a yellowish white ventrally; tibiæ of fore legs dark dorsally and light ventrally, except the very base and apex, which are a brilliant golden yellow; tibiæ of mid-legs mostly golden yellow, darker near the base, and a band of dark scales at the apex; tibiæ of hind legs dark blue, with green iridescence; metatarsi of fore legs nearly white, except a small basal spot of dark blue on the ventral aspect; of mid-leg nearly white, except a rather large dark spot on the dorsal surface; of hind legs dark blue, except a light basal band; 1st tarsal of fore leg is white, except an apical dark band, all the remaining joints dark; 1st tarsal on mid-leg and all the following are light yellow to white, except the last, which has a brown tip; 1st tarsal of hind legs is light, with a tiny dark apex, all the rest of the joints dark. Ungues simple and equal. In some lights there is a very narrow apical band of violet on all the femora, and on the mid and hind tibiæ reddish.

Wing clear reddish brown, sparsely scaled with brown, broadly truncate scales; 1st submarginal cell very short, very little more than half the length of 2nd posterior, and much narrower; mid and posterior cross-veins meet, and are about the same length; supernumerary cross-vein about half the length of mid, and three times its own length exterior to mid. Halteres orange brown.

There is a strong fold near fifth long vein, so that it makes a curvature in the margin of the wing.

Length, 12 + mm.

Habitat, Margosatubig, Mindanao, Philippine Islands.

Taken June and July.

Described from five specimens sent by Dr. H Newton Kierulf, Cont. Surg. U. S. Army, and evidently lies near *speciosus*, Skuse, and *Marshalii*, Theob., and may easily be the female of a species in which only the male has been known, but at all events it is sufficiently unlike such descriptions as I have been able to find to warrant my assuming it to be new.

(To be continued.)

NOTES ON THE CLASSIFICATION AND NOMENCLATURE OF THE HEMIPTEROUS SUPERFAMILY MIROIDEA.

BY G. W. KIRKALDY, HONOLULU, H. I.

Since the final impression of my "List of the genera of the Pagiopodous Hemiptera Heteroptera," etc. (a), I have received from my friend, Dr. O. M. Reuter, a very valuable summary of his most recent thoughts on the Classification of the Miridæ (b).

Dr. Reuter's polemic has been evoked by the Hemipterous work of Mr. Distant, particularly that dealing with the Miridæ (or "Capsidæ") in the Biologia Centrali-Americana, Heteroptera, Vol. I, and the Fauna of British India, Rhynchota, Vol. II. In the latter Mr. Distant avers that Reuter's classification of the Miridæ "is more reflective of personal opinion, and contrived for the purposes of entomological arrangement, than exhibiting an evolutionary or philosophical conception" (pp. 412–3), and thereupon divides the Miridæ into two subfamilies, characterized by the presence or absence of "a longitudinal incision or sulcation on the upper surface" of the head (!).

Reuter declares that this emphatic judgment is as unjustified as it is untrue, and that it is, at least, unseemly for an author whose studies on Hemipterous systematics are so superficial as are those of Mr. Distant, to pass so judicial a sentence.

The learned Finlander proceeds to refute Mr. Distant in great detail, first tracing the evolution of our knowledge of the classification, from Fieber, in 1858, onwards; he next discusses, at considerable length, various salient points in the characteristic structure of the family, and presents two new synopses, and a genealogical tree, of the divisions. This "Classification" is without doubt one of the most important of the Heteropterous memoirs that has appeared for a long time, and represents the almost mature fruits of Dr. Reuter's many years of assiduous devotion to his favourite family. It is impossible to summarize here the fifty-eight pages, further than to reproduce, in English, the analytical table of the accepted divisions; the form of the table has been altered, while preserving its matter. The tribe Lygæoscytini (c) and the genus

(a) Tr. Amer. Ent. Soc., XXXII, 117–56 (1906).

(b) "Hemipterologische Spekulationen, I, Die Klassifikation der Capsiden," Festschr. für Palmén, No. 1, pp. 1–58, and a genealogical Table. [Dated 1905, at Helsingfors, but probably not issued till 1906.]

(c) I prefer the ending "*ini*" to "*aria*," as more in line with general nomenclature.

Oligobiella are not yet sufficiently studied. I have not at the moment any examples of *Sulamita* before me, and therefore cannot add to Reuter's remarks on the Sulamitini.

1. Third segment of tarsi linear (very rarely—in *Hypselœcini*—slightly thickened towards the apex). Apical margin of pronotum neither hood-like nor cystiformly elevated ..... 2.

1a. Third segment of tarsi thickened towards the apex, or apical margin of pronotum hood-like or cystiformly widened. First segment of tarsi deeply sulcate. Tibiæ always unarmed. Wing cell without hook. Prosternal-xyphus margined ..... 14.

2. Prosternal-xyphus swollen, rarely with two impressions *(Boopidocorini)*. Wing-cell usually with a hook. Pronotum without apical constriction. Loræ narrow, sharply separated above and below ..... 3.

2a. Prosternal-xyphus margined (d) ..... 6.

3. Arolia fused with the claws, sometimes very small or absent ..... 4.

3a. Arolia free, inwardly arched. Genæ high. Wing-cell with hook ..... 4, *Hypselœcini*.

3b. Arolia wanting or very delicate. Wing-cell with or without hook. Apical margin of pronotum with an impressed, more or less wide (never swollen and smooth) margin .. 5, *Camptotylini* (Exæretaria).

4. Wing-cell with hook ..... 5.

4a. Wing-cell without hook ..... 3 *Cremnorrhinini*.

5. Pronotum not, or very finely, punctured ..... 1, *Chlamydatini* (Plagiognatharia).

5a. Pronotum coarsely punctured. Tarsi very long. Eyes very large. Vertical margin keeled ..... 2, *Boopidocorini*.

6. Arolia fused with the claws, or at least approximate to these, sometimes rudimentary. Wing-cell with hook. Loræ narrow, above and below sharply separated. Pronotum without apical constriction ..... 6, *Xenocorini* (Oncotylaria) and *Nasocorini*.

6a. Arolia free, converging towards the apex or parallel, sometimes absent (rarely in some *Macrolophini* fused with the claws) ... 7.

6b. Arolia always present, free, diverging towards the apex, and slightly widened ..... 12.

(d). Only in the aberrant *Stethoconus*, Flor. *(Campyloneurini)*, and *Histriocoris*, Reuter *(Capsini)*, strongly convex.

7. Arolia free, converging towards the apex. Wing-cell without a hook. Pronotum without apical constriction. Genæ very rarely high. Loræ sometimes separated also beneath. Eyes inwardly mostly emarginate. Tibiæ slender, typically without punctures ..... 7, *Heterotomini* (Cyllocoraria).

7a. Arolia free, converging towards the apex or wanting. Wing-cell very rarely without a hook. Pronotum with apical constriction (which is sometimes hidden under the posterior margin of the posteriorly-produced hind margin of the vertex). Loræ narrow, sharply separated above and beneath ..... 8, *Pilophorini.*

7b. Arolia very delicate, or absent (sometimes clearer in some *Macrolophini*, but fused with the short claws). [Wing cell without hook. Pronotum with apical constriction (e)] ..... 8.

7c. Arolia free, converging towards the apex, or parallel. Wing-cell very rarely with hook. Pronotum without apical constriction. Vertex wide. Genæ high. Rostrum strong ..... 11.

8. Head elongate, feebly declivous. Loræ sharply separated above and beneath, narrow. Tarsi very slender. Sides of pronotum acute, at least posteriorly ..... 9, *Fulviini.*

8a. Head vertical ..... 9.

9. Head not strongly elongate ventrally. Clypeus not humpily swollen in the middle ..... 10.

9a. Head ventrally strongly elongate. Clypeus humpily swollen in the middle. Genæ very high. Neck very short. Tarsi slender, first segment long ..... 14, *Cylapini.*

10. Arolia very delicate, or fused with the short claws. Loræ sharply separated above and below, narrow ..... 10, *Macrolophini* (Dicyphariaj.

10a. Arolia absent. Loræ only separated above, arched .. 11, *Garganini.*

11. Body generally robust, never constricted in the middle. Loræ generally separated above and below, but wide. Tibiæ often robust. Membrane with two cells ... 12, *Halticini* (Laboparia).

11a. Body generally narrow, constricted in the middle. Loræ separated only above. Tegmina wings usually very rudimentary. Membrane of macropterous form without cells, with irregular nerves ..... 13, *Myrmecophyini.*

(e) Added in MS. by Dr. Reuter.

12. Wing-cell with or without a hook. Pronotum with thick apical constriction. Callosities limiting the constriction posteriorly, as long as the latter. Head vertical, genæ high ....15, *Resthenniini.*

12a. Wing-cell always without a hook. Pronotum without an apical constriction or with a "spurious stricture." Sides acute, at least anteriorly. First segment of antennæ and tarsi long..16, *Mirini.*

12b. Wing-cell always without a hook. Pronotum with a true apical constriction (sometimes not clear in brachypterous forms), sides rarely acute anteriorly..... 13.

13. Body oval or parallel, very rarely narrow and constricted medially. Labrum narrow. Genæ rarely high. Loræ separated only above.....17, *Capsini.*

13a. Body elongate, constricted medianly. Labrum very wide, crescentic. Genæ very high. Neck very long. Loræ wide, but also separated from below ..... 18, *Myrmecorini.*

14. Third segment of tarsi linear or very little thickened. Arolia very delicate, free. Loræ above and below sharply separated, narrow. Apical margin of pronotum hood-shaped or strongly swollen .....19, *Ambraciini* (Clivinemaria).

14a. Third segment of tarsi thickened towards the apex. Arolia large, very closely approximated to the claws, often fused with these. Loræ separated only above. Membrane mostly unicellular... .....20, *Bryocorini.*

II.

The following additions and emendations to my "List" are necessary. I regret that Reuter's "Classification" was not published earlier, but although some shifting of the group constituents of my list will take place, the references to type fixations will remain practically unchanged, so that its prime purpose is fulfilled. The chief disturbances are in tribe 13. in which Reuter leaves only *Cylapus* and *Vannius*, removing almost all the rest to the Bryocorini.

P. 119, gen. 1, for "*Dolichomerius*" read "*—merus.*"

P. 120, gen. 15, is dated 1871.

P. 121; gen. 29, add "(*Odontobrachis*, Reuter, 1884, A. S. S. Fenn., xiv, 203").

P. 121, gen. 31, after "Mulsant" add "and Rey."

P. 122, for "Plagiogastharia" read "Plagiognatharia."

P. 123, gen. 18, the correct citation is "Reuter, 1875, Bih. Vet. Ak. Handl., iii, 57, type *onustus* (Fieber), Reut., 1878, A. S. S. Fenn., xiii, pt. 1, Pl. 4, f. 3, and Pl. 1, f. 2."

P. 124, gen. 32, make this a synonym of *Reuteroscopus*, Kirkaldy, 1905, Wien. Ent. Zeit., xxiv, 268.

P. 124, gen. 36 belongs to the Capsini.

P. 124, add "44" before "*Phylus*."

P. 125, for "Oncotylini" read "Xenocorini."

P. 126, gen. 16, read "*Malthacosoma*."

P. 127, gen. 11, add as synonym, No. 51, on p. 138.

P. 128, gen. 24, for "Bull. Soc. Nat., Moscou (sep. ?)" read "Mel. Ent., ii p."

P. 128, gen. 28, add as synonym "*Schistonotellus*, Reuter, 1905, Oefv. Vet. Förh., xlvii, No. 20, p. 32" (*dromedarius*, f. 15a).

P. 128, gen. 32, remove to tribe 6 Cremnorrhinini (p. 129).

P. 129, for "Campyloneurini" read "Macrolophini," and for "Cremnorrhini" read "Cremnorrhinini."

P. 130, add genera 17, 18 and 20, on pp. 136–7, to the Halticini.

P. 130, note 5, line 4, for "260" read 206." N. B.—Pp. 1–190, or the second half, of Reuter's "Rev. Crit. Caps.," appear to be a reprint of the Hem. Gymn. Scand," without the Plate.

P. 131, gen. 17, Reuter removes this to the Bryocorini.

P. 132, line 14, for "*oschanini*" read "*oschannini*."

P. 132, gen. 6, for "?" read 10," and delete "(separate?)."

P. 133, gen. 11, Reuter considers that this is probably a Heterotomine.

P. 133, gen. 26 and 28, remove to Capsini.

P. 133, gen 29, for *albofasciatus* read *unifasciatus*.

P. 134, tribe Cylapini; Reuter removes 3 to the Capsini, retains 1 and 4 in the Cylapini, and most (or all) of the rest to the Bryocorini. I regret I cannot altogether follow him in that.

P. 134, gen. 7, add as a synonym, gen. 24 (p. 146).

P. 134, gen. 18. The following is appended to render valid the genus *Sahlbergella:* "Closely allied to *Deimatostages*, Kuhlgatz, but the pronotum and scutellum are not tuberculate, the head is more declivous, and the form of the pronotum and scutellum in profile is different."

P. 134, gen. 19, for *Odoniella*, "Haglund," read "Reuter, 1905, Oefv. Finsk. Förh., xlvii, No. 10, p. 2, type *Reuteri* (Haglund), Reuter.

P. 136, gen. 10, add ("*Dyoncus*, Fieber, 1860, Eur. Hem., 67").

P. 136, gen. 13, read "*Resthenia*, Spin., etc., subgenus 1, *Platytylus*, Fieber, etc., = *Callichila*, Reuter, etc." Reuter forms a division (Resthenini) from this and *Mimoncopeltus* (= *Lygdus*).

P. 136, gen. 5, to *Lopistus*, add as synonym, †"*Capsodes*, Dahlbom, 1851. K. Vet. Ak. Handl. (for 1850), 214 (not descr.)."

Pp. 136–7, remove gen. 17, 18 and 20 to Halticini.

P. 137, gen. 30. Reuter thinks this may belong to the Pilophorini.

P. 137, gen. 31. Reuter forms a division (Garganini) from this.

P. 138, gen. 44. According to Reuter (1905) *Pantiliodes* (p. 136, gen. 6) is a synonym of *Creontiades*.

P. 139, add as 68a *Liocoridia*, Reuter, 1903, Oefv. Finsk. Vet. Förh, xlv., No. 16, p. 13 (= *Liocoridea*, Reuter, 1906, Yezh. Zool. Mus. Imp. Nauk., Peterb., X, 51), type *Mutabilis*, Reuter, Pl. 2, f. 4, = *Gismunda*, Distant, p. 140 (gen. 91).

P. 140, gen. 80, read "*Charagochilus*."

P. 141, gen. 101, remove to Macrolophini (p. 129).

P. 141, gen. 98, for "n.n." read "1906 (June), T. N. Zealand Inst., xxxviii, 62." [The Tr. Am. Ent. Soc., xxxii, p. 141, is dated "May," but was not published till at least August.]

P. 142, gen 113, read "*Thyrillus*."

P. 142, gen. 119 and 120, *Callicratides*, Distant, is a synonym of *Hyalopeplus*, Stal.

P. 143, gen. 131, add "fig. 2."

P. 143, gen. 139, read "Costa, 1841, A. S. E., France, X, 294, type *italicum*. Costa, 1855 (?), Atti Nap., 251, Pl. 2, f. 1 = *Grylloconis*." etc.

P. 145, add gen. 24, *Saturniomiris*, Kirkaldy, 1992, T. E. S., London, 268, type *tristis* (Walker), Kirk.

P. 145, gen. 5. Reuter places this in the Pilophorini.

P. 145, the date of "*Heidemannia*" is 1891.

P. 146. Reuter places *Thaumastomiris* and *Perissobasis* in the Bryocorini.

P. 146. *Ambracius* is placed in the Clivinemini (p. 135) by Reuter, who incorrectly spells it *ambrocius* and *ambrosius*. *Opellus* (No. 7) belongs there also. Genus 8 should be deleted. The date of Stal's genera in K. Sv. Ak. Handl., 2, pt. 7, is 1860.

P. 146, gen. 15, the preoccupied name *Lygdus* should be superseded by *Mimoncopeltus*, nov.

P. 146, gen. 16 and 17 are placed by Reuter in the Bryocorini, 18 and 19 in the Macrolophini.

P. 147, add "Family 3a, Polyctenidæ.

"Genus 1. *Polyctenes*, Giglioli, 1864, Q. Journ. Micr. Sci., IV, 25, type *molossus*, Gigl., Pl. Ib., figs. 13–14.

"Genus 2. *Euroctenes*, gen. nov., type *lyræ* (C. O. Waterh., 1879, T. E. S., London, Pl. IX, figs 1–2).

"Genus 3. *Eoctenes*, gen. nov., type *spasmæ* (C. O. W., op. c., figs. 3–4).

"Genus 4. *Hesperoctenes*, gen. nov., type *fumarius* (Westw., 1874, Thesaurus Ent. Oxon., Pl. 38)."

The characters of these four genera have been indicated by various authors, but only one, *Polyctenes*, has been named:

1. Palæogæic forms; posterior legs comparatively short and stout, about half the length of the bug; the claws unequal, one nearly simple, the other large and bent, its basal tubercle nearly as long as the simple claw ..... 2.

1a. Neogæic forms; posterior legs as long as the bug; claws nearly equal, with a small tooth at the base ..... 1, *Hesperoctenes*, mihi.

2. Antennæ long, the third segment almost (or more than) as long as the fourth ..... 3.

2a. Antennæ shorter, third and fourth segments about equally long ..... 4, *Eoctenes*, mihi.

3. Head medianly wider than long. Pronotum transverse ..... 3, *Polyctenes*, Gigl.

3a. Head medianly longer than wider. Pronotum elongate ..... 2, *Euroctenes*, mihi.

P. 147, delete entry (on p. 147 only) of Family 5, and read: "Family 5, Dipsocoridæ (Monogr., as *Ceratocombidæ*, Reuter, 1891, Act. Soc. Sci., Fenn., XIX, No. 6, pp. 1–28, Pl.).

Subfamily 1, Dipsocorinæ.

"Genus 1. *Lichenobia*, Bærensprung, 1857, Berlin Ent Zeit., I, 165 (= *Ceratocombus*, Fieber, 1860), Wien. Ent. Mon., IV, 267, type *muscorum*, Fall. (= *Coleoptrata*, Zett.), type *ferruginea*, Baer. (= *Coleoptrata*, Zett.), fig., Signoret, 1852, A. S. E., France (2) X. Pl. 16, f. 3, as *Astemma Mulsanti*."

N. B.—*Ceratocombus* was only named, not described, by Signoret.

P. 148, line 3, read "*Trichotonanus*."

P. 148, date of footnote 20 is 1836.

P. 126, gen. 28, make this a synonym of *Lopus*, Hahn, 1833, Wanz. Ins., I, 143, Pl. 1, f. 4, type *Chrysanthemi*, Hahn (= *decolor*, Fall).

P. 146. add Tribe 27, Lygæoscytini.

Genus 1. *Lygæoscytus*, Reuter, 1893, E. M. M., xxix, 151, type *cimicoides*, Reuter, fig.

P. S.—I have just received the 3rd volume of Distant's "Fauna of British India, Rhynchota" (1906), wherein his doubtful Anthocorid genera are figured as follows:

Ostorodias, f. 1; *Arnulphus*, f. 2; *Amphiareus*, f. 3; *Lippomanus*, f. 4; *Sesellius*, f. 6. *Euspudæus*, Reuter, is also figured (f. 5), also the following Water-bugs: *Cheirochela feana* (16), *Gestroiella* (17), *Heleocoris strabus* (19), and *Ctenipocoris* (20). I find I omitted from my list the Naucorid *Thurselinus*, Distant, 1904, Entom., xxxvii, 259, type *Greeni* (figured F. B. I., f. 21).

QUEBEC BRANCH—ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Ninth Annual Meeting of the Quebec Branch was held at the house of the President, Rev. Dr. Fyles, Levis, P. Q., on Oct. 13, 1906—twelve present.

Dr. Fyles described an excursion that he had made through the border townships which had been ravaged some years ago by the Larch Saw-fly, *Nematus Erichsonii*, Hart. He found that in all that section of the country there was not a first-growth tamarack left, and that most of those of a later growth were also destroyed; their places were now taken by a new growth of balsam, poplar, spruce and birch, varying with the nature of the soil. He also exhibited a fine nest of the wasp *Vespa arenaria*, Fab., which he had found in an open field, an inch or so from the ground, supported by some grass stems and that of an aster. It resembled a round stone or a large puff ball, and contained a surprisingly large number of cells. A female emerged from one of the cells on Sept. 9.

Miss Freeman exhibited a number of beautiful and interesting specimens taken at Lorette, P. Q., and mentioned having found about a dozen butterflies, *Eugonia J-album*, in an unoccupied room, where they evidently intended to pass the winter.

Lt.-Colonel Lindsay gave an interesting account of a Caddis-fly, frequenting lakes and streams, which he found very abundant in August. It is preyed upon by both trout and insectivorous birds, so that between the crop of the bird and the maw of the fish—its Scylla and Charybdis—the unlucky insect finds it difficult to steer its course.

The following officers were elected for the coming year: President, Rev. Dr. Fyles; Vice-President, Mrs. Richard Turner; Secretary-Treasurer, Lt.-Colonel Crawford Lindsay; Council, Hon. Richard Turner, Mr. J. H. Simmons, Miss Bickell, Miss Freeman, and Miss Hedge.

CONTRIBUTIONS TO THE ENTOMOLOGY OF THE SELKIRK MOUNTAINS OF BRITISH COLUMBIA.—I. INTRODUCTORY.

BY J. CHESTER BRADLEY, UNIVERSITY OF CALIFORNIA, BERKELEY, CAL.

In company with a party of botanists and others, the writer spent the summer of 1905 in the Selkirk Mountains of British Columbia, much of the time in scientifically unexplored parts of that beautiful range. The Selkirks occupy the major part of the Kootenay district of south-eastern British Columbia. It will be seen by reference to a map that they are bounded on practically all sides by the Columbia and Kootenay Rivers and the long and narrow Kootenay Lake. They form, especially in the northern part, an exceedingly rugged region of lofty peaks and ridges, cut by deep, densely-wooded valleys. The vegetation is said to be much denser than in the Rockies of corresponding latitude, and differs somewhat from it in the nature of its trees, etc. It certainly is almost impenetrable in many places, and to take a pack animal where there is no cut trail is out of the question.

The region is divided by the Canadian Pacific Railway into a northern and southern district, more or less differentiated in natural as well as other features. The southern part is a mining country, and in some of the valleys are occasional mining settlements, and even railroads and small towns. It contains a few large lakes, on one of the most beautiful of which is situated the little town of Kaslo, where Dr. Dyar and Messrs. Currie and Caudell made the headquarters of their expedition of the previous season, and where Mr. Cockle, an enthusiastic entomologist, has accumulated an extensive cabinet of local insects. Some distance north of this, on the shore of Howser Lake, our party spent two weeks, and considerable collecting was had. A little marl bog on the opposite shore furnished collecting grounds of a type not elsewhere met with.

The northern district is not penetrated more than a mile or two from the railroad by any evidence of civilization, excepting three or four small mining camps and the occasional hut of a trapper. Even the latter is very, very scarce. Although scientists have sometimes penetrated into the Rockies north of the railroad, they have not, so far as I am aware, entered here. Yet the region is attractive in the highest degree. The

richness of the vegetation only lends a greater charm. The lower slopes are covered with unbroken noble forests of evergreen, as yet but slightly touched by the destroying-hand of the lumberman. The trees often average 150 feet high, while heights of 200 feet and diameters from seven to nine feet are not uncommon. Hemlocks, Arbor-vitæ and Douglas spruce make up the bulk of the forest below 4,000 feet, above which they are replaced by fir. Deciduous trees are very sparingly represented by a few birch, poplars, and in the alpine meadows by willows. A distinct timber line is present at an altitude of about 6,000 feet, above which one may roam over vast stretches of alpine meadows, characterized by a luxuriant growth of grass and flowers, now stretching away over quiet slopes upon which the caribou love to graze, or again suddenly interrupted by more rugged topography, yawning chasms and steep rock walls. There are many beautiful glaciers and snow-fields of vast extent, and the rugged peaks where these are found are the homes of many a fine white mountain goat, and more rarely of bighorn sheep, of both of which we saw several. The glorious combination of harmonizing colours, the deep blue and white of the glaciers and snow, the light green of the alpine meadows, or in places white or red or yellow with flowers, all contrasted with the rich dark green background of the firs at timber line or growing in beautiful isolated groups above, is a sight which would alone well repay the most arduous journey and leave its imprint on the soul of the traveller forever.

We were encamped for two weeks at timber line, at a distance of over 60 miles north of the Canadian Pacific, in what is known as the Big Bend Country, because here the Columbia River makes its grand bend from a north-westerly to a south-westerly course. At this altitude the most evident insects were several species of Bombus, great numbers of *Vespa occidentalis*, two species of Tabanidæ, and a very abundant and exceedingly annoying Leptid of the genus Symphoromyia. *Labidia opimus* was fairly common, but no other Saw-flies, except a single specimen of Lyda, were found. Below 4,000 feet more species of Bombus, Vespas as before, several species of Saw-flies and of Longicorn beetles related to Leptura. Where Downie Creek flows into the Columbia, we were encamped for a week, and here shore and aquatic, woodland, and flower-loving species were in great abundance.

At our camp along the shore of the Columbia River, a few miles north of the town of Revelstoke, were found especially wood-inhabiting

species, Longicorns and Buprestids, *Sirex albicornis* and *abdominalis* and *Xeris caudatus*, Braconid parasites of wood-boring Coleoptera, and especially *Odontaulacus editus*, of which I took 26 specimens. Along moist spots on the trail and shore were large numbers of bees of many kinds and swarms of butterflies.

The botanical results of the expedition were more thorough and important than the zoological, and will prove invaluable to the student of the fauna as well as the flora. Over 20,000 sheets were brought home, and an additional 18,000 the previous season. These represent very fully the flora of the region. In addition to this, the party was equipped with registering thermometers, sling psychrometers, aneroid barometers, radiation thermometers, evaporometers, photographic outfits, and other apparatus for studying the ecological and bionomical conditions that prevail, and which will, I hope, result in facts of no less importance to the zoologist than to the botanist. The leader of our expedition was Dr. Charles H. Shaw, Professor of Botany in the Medico-Chirurgical College of Philadelphia, an enthusiastic naturalist and a charming companion, to whom the author wishes to express his thanks for many courtesies and facilities provided for his work. Among other members of the party were Prof. Heinrich Peterson, of Ursinus College; two students from the Medico-Chirurgical College: Mr. Merkel Jacobs, of the University of Pennsylvania, and part of the time Miss Alberta Cory, of the Kansas City High School; Miss Ellen Runner, of Lake Forest College; Miss Mary T. Jobe, of the Cortland (New York) State Normal School, and others. Some of these were interested in botany, several of them devoting their entire attention to the collection of plants. I was the only member of the party interested in zoology.

II.—New Aculeate Hymenoptera.

I hope to be able to publish from time to time lists, notes and descriptions, which will be preliminary to a knowledge of the insects of the region. As a beginning, I here publish the descriptions of three Hymenoptera, one a Bethylid of the genus Gonatopus, remarkable for its curious and ungainly appearance and for its rarity. Another is of the family Pemphredonidæ of the genus Blepharipus, which has heretofore been known in America from three female specimens representing two species. There is one European species.

Blepharipus columbiæ, n. sp. (Crabronidæ.)

♀.—Differs from *B. nigricornis* in having the posterior tarsi entirely black instead of yellow at the base; the abdomen is less elongate, and the propodeum has indistinct transverse ridges on the posterior face, and short longitudinal ridges on the base above joining the postscutellum.

Habitat.—Ground-hog Basin, Selkirk Mts., B. C. July 24, 1905.

Type.—One ♀ in the collection of Cornell University.

Spilomena alboclypeata, n. sp.

♂.—Head and dorsum without the scattered punctures of *Foxii;* antennæ fuzzy pubescent, the scape lemon-yellow, the pedicel yellowish; sides of the face, clypeus and mandibles white, tibiæ and tarsi pale, otherwise black.

Habitat.—Revelstoke, Selkirk Mts., B. C., July 1, 1905.

Type.—One male in the collection of Cornell University.

The male of this genus has not been heretofore known in America. There is a specimen of *pusilla* male in the collection of the American Entomological Society which differs from the female in having the clypeus and sides of the face yellow and the legs entirely honey-yellow.

Gonatopus cyphonotus, n. sp.

(κυφωνοτος = hump-backed.)

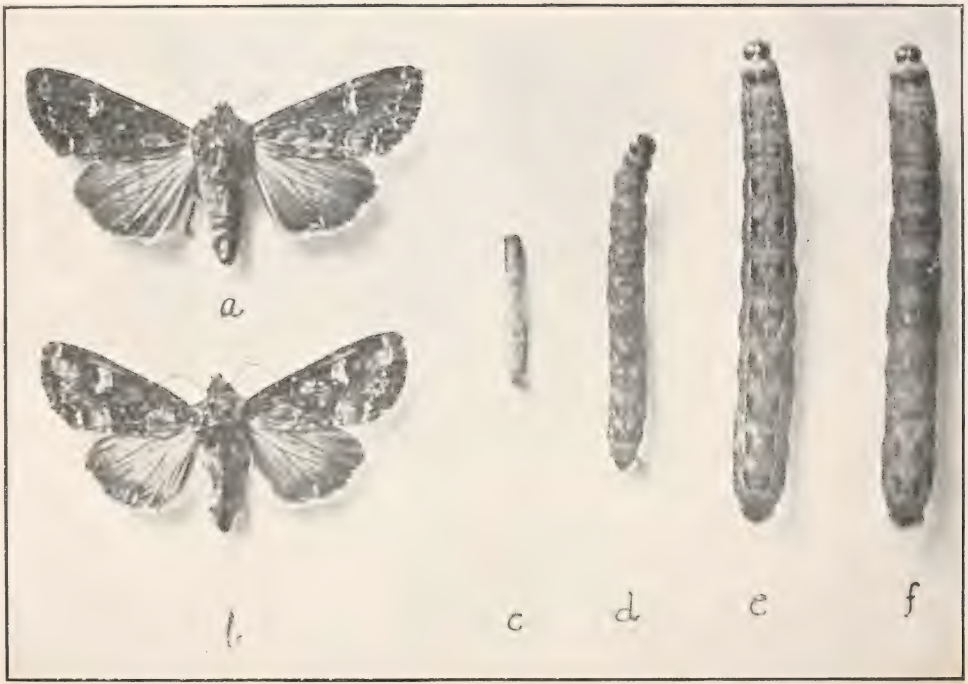
♀.—Black, except scape, pedicel, face, mandibles, trochanters, all coxæ beneath, knees, posterior and middle tibiæ in the middle, and anterior tibiæ and tarsi above, lemon-yellow, rest of legs beyond the swollen part of the femora reddish-yellow. Thorax above and abdomen smooth, polished and shining; thorax on the side, constriction between the mesothorax and propodeum above, head, and coxæ, finely-roughened; propodeum posteriorly a little more coarsely roughened; hump of thorax without a V-shaped emargination, with an ocellus-like tubercle on each side. Length, 2.5 mm.

Habitat.—Downie Creek, Big Bend Country, Selkirk Mts., British Columbia.

Type.—One female in the collection of Cornell University.

In the type of *contortulus*, Patton, the entire thorax is covered with a fine transverse striation, more prominent on the propodeum. This is entirely wanting in *cyphonotus*, and in the latter the constriction between the mesothorax and propodeum is less marked.

Mailed November 6th, 1906.



THE SPINED RUSTIC—BARATHRA CURIALIS, SMITH. (ENLARGED ONE-FIFTH.)

The Canadian Entomologist.

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THE LIFE-HISTORY OF THE SPINED RUSTIC, *BARATHRA CURIALIS*, SMITH.

BY JAMES FLETCHER AND ARTHUR GIBSON, OTTAWA.

In the Report of the Entomologist and Botanist to the Dominion Experimental Farms for 1905, at pages 179 and 180, considerable space is given to a discussion of an outbreak of a large noctuid caterpillar, which appeared in considerable numbers in Canada during 1905. Complaints of injury by this insect were received from a wide area, extending from Nova Scotia as far west as Lake Superior. During July many kinds of plants in gardens were attacked by smooth cutworm-like caterpillars, which when small were greenish in colour, having the body divided into two equal areas above and below the spiracles by a wide black stigmatal band. In later stages of growth the upper of these areas is much darker by reason of some black velvety patches above the lateral stripes, on the dorsal area, and the under side of the body becomes pale and of a yellowish hue. These caterpillars were largely nocturnal and solitary in habit, and presented a handsome appearance, with the same velvety patches so conspicuous on *Peridroma astricta* and *P. occulta*, with three lines down the back, and having each segment ornamented with two large velvety black patches. There is great variation in the ground colour, some larvæ appearing to be almost black, while others have a dark olive-green aspect, but all specimens show a distinct stigmatal band, along the side just below the spiracles, which is yellow in colour, marked centrally with red.

In the above-mentioned report this insect was treated of under the name of *Barathra occidentata*, Grote, but we have since learned from Sir George Hampson, of the British Museum, that the species is really *B. curialis*, Smith, and this identification has been confirmed by Dr. J. B. Smith and Dr. H. G. Dyar. In the past this insect has been extremely rare in Canada, the only abundant occurrence which has taken place during the last thirty years being in 1905, and although the larvæ were very abundant that year, very few of the moths were taken during the past season. No parasites were bred from material collected in the field in 1905.

We were fortunate enough to secure a batch of eggs from a confined female, and the following notes were taken upon the preparatory stages:

Egg.—Dome-shaped; tapering slightly to the base; diameter, 0.6 mm.; height, 0.4 mm., with about 44 ribs. In confinement the eggs were laid in a large flat patch in close, even, rows of from ten to twenty eggs in a row. Over 700 eggs were laid by a single female. Eggs hatched on July 5 and 6.

Stage I.—Length 2.5 mm. Body cylindrical, after feeding pale greenish; skin smooth and shiny. Head 0.3 mm. wide; rounded, deeply emarginate at vertex, shining, blackish-brown. Thoracic shield, piliferous tubercles and anal shield all shiny black. No markings on body.

Stage II.—Length 5.5 mm. Body pale green. Head 0.6 mm. wide, pale brownish, with darker brown around each hair. Thoracic shield concolorous with body. Dorsal stripe whitish; lateral stripe irregular and rather wavy; stigmatal band whitish, faint. Tubercles black, conspicuous, shining, each with a stiff black bristle. Feet concolorous with body.

On July 10 a few specimens moulted the second time, many others soon afterwards.

Stage III.—Length 8 mm. Head 0.9 mm. wide, greenish-brown, distinctly marked with large black spots, which are of about the same size as, and appear as a continuation of, the tubercles on the body. In addition there are numerous dark dots over the whole head; ocelli black. Body above spiracles darker than in Stage II, and of almost the same colour as the upper surface of a clover leaf upon which they were feeding. Below stigmatal band the colour of the body is pale green. Dorsal stripe white, distinct on all segments; lateral stripe white, but uneven and broken in places; stigmatal band whitish, not distinct. Tubercles black, setæ now pale. Tubercles above spiracles surrounded with white. Spiracles black. Thoracic feet rather translucent, prolegs concolorous with venter.

On July 12 and 13 a large number of the larvæ passed the third moult.

Stage IV.—Length 13 mm. Head 1.4 to 1.6 mm. wide, of the same appearance as in Stage III. Body dark green above spiracles, paler on ventral area; some specimens darker green than others, and one with a decided brownish tinge; whole dorsum now marked with dots and short streaks of white; colour of all specimens in the incisures whitish or pale yellowish. Dorsal stripe not so even as in last stage; lateral stripe as before; stigmatal band wide, whitish, paler below the spiracles, and suffused with green, some specimens bordered above the band with dark green. Spiracles pale, rimmed with black. Feet concolorous with body; thoracic feet rather translucent and shiny.

On July 14 many specimens moulted for the fourth time.

Stage V.—Length 18 mm. The larvæ in this stage are not constant in general appearance as heretofore, but vary considerably in colour, being pale green, brownish green, or decidedly pale brownish. Head 2.0 to 2.2 mm. wide, in the light coloured larvæ pale, almost concolorous with the body, and without any spots, but in the darker larvæ distinctly mottled and marked with dark brown, particularly on the inside upper portion of cheeks. The green larvæ are almost exactly the same as in Stage IV, but the brownish larvæ are different. In these specimens the dorsal stripe is broken, and is bordered on either side with dark brown, and in the incisures, especially those of the central segments, the colour is decidedly yellowish. Sublateral area rather heavily dotted with black or dark brown, giving a blackish appearance to this area just above the spiracles. The stigmatal band in some of the green larvæ is now inconspicuous, the upper margin showing simply as a white line connecting the spiracles. In the darker specimens it is much the same, but more conspicuous on account of the dark colour above the spiracles, and the space occupied in previous stages by the stigmatal band being flushed slightly with red. Spiracles white, elongated, rimmed with black. Ventral surface of all specimens pale green, marked with small white spots and streaks. Feet pale.

On July 19 some of the larvæ again moulted.

Stage VI.—Length 27 mm., cylindrical. Head 3.0 to 3.2 mm. wide, rounded, honey-yellow, coarsely mottled with dark brown; frontal field and clypeus dark brown, not mottled; clypeus large, margined with white, and running three-quarters up the face to the base of the vertical groove; mandibles tipped with black. Ground colour of body in varying shades of gray or drab; all larvæ dark, none green. A few specimens are of a rather ruddy brown hue. The dorsal and lateral stripes are clearly defined, but less conspicuous than before. Somewhat triangular-shaped black velvety patches lie above the lateral stripes and run out to the dorsal stripe, where they sometimes almost meet on the anterior portion of the segments. These are more conspicuous on the posterior segments, but on some specimens hardly show at all. Above each spiracle there is also a conspicuous black velvety field clearly defined below, which renders the upper margin of the stigmatal band very distinct. The stigmatal band itself is pale yellow, and much flushed with red, particularly below the spiracles. Spiracles white. Ventral surface pale green, the darker specimens sometimes streaked and mottled with black on the substigmatal area. The ruddy specimens similarly show a red mottling. Piliferous

tubercles inconspicuous in most specimens. Thoracic and anal shields concolorous. Feet concolorous or slightly infuscated. Length when full grown 44 to 48 mm., width 6 to 8 mm.

These larvæ were very active through all their stages, and when full-fed wandered about a good deal. On July 26 most of them were full-grown, and many buried and pupated in oval cells about four inches below the surface.

Pupa.—19–23 mm. long, 5.5–6.5 mm. wide at widest part, rather slender, abruptly pointed at anal end; dark chestnut brown, shining. Anterior third of abdominal segments deeply and coarsely punctured. Cremaster conical, black, deeply roughened and grooved longitudinally, with a pair of slender terminal rigid bristles 0.7 mm. long, separate but close together, with the tip of each expanded into a button with recurved edges.

The pupæ were kept in a cool cellar all through the winter, and were brought up to the office about the end of April. The moths emerged from May 4 to 26, three or four weeks earlier than the species was collected outside.

Food-plants.—Up to Stage IV the larvæ were fed chiefly on clover, grass and dandelion, but as they did not seem to be growing fast enough they were changed to Bleeding-heart *(Dielytra spectabilis)*, specimens having been found in considerable numbers on this plant at the Experimental Farm. Other plants which seemed to be particularly attractive to these caterpillars in a state of nature were Larkspurs, of which the seed-capsules were much injured, Spinach and Cabbage. They are, however, rather general feeders, but being nocturnal in habit, their food-plants were rather difficult to detect.

THE CLASSIFICATION OF THE CULICIDÆ.

BY S. W. WILLISTON, UNIVERSITY OF CHICAGO.

In the revision of my Manual of North American Diptera, now in press, it has been necessary for me to examine critically the recent publications on the classification of the Culicidæ. Although I have never ceased to be an interested reader of dipterological literature, I was hardly prepared for the flood that has nearly swamped me in the attempt to reach *terra firma.*

It is unfortunate that, among the score or more who have written upon the classification of this family within the past six years, nearly all have been amateurs in entomological taxonomy, some, indeed, whose only papers on entomology have been those proposing new "subfamilies." I

do not wish it to be inferred by my statement that I impugn the ability of many of these writers ; far from it. The fact, nevertheless, remains, that no one is competent to discuss philosophically the classification of any group of animal life who is not well grounded in the principles of taxonomy as applied to related animals. And the ignorance of related Diptera has been, more than once, deplorably shown by writers on the Culicidæ. A writer who persistently calls the beginning of the third longitudinal vein a "supernumerary cross-vein," and the fourth posterior cell the "anal cell," without in the least attempting to show that the standard authors on Diptera have been greviously in error, is, from the very nature of the case, incompetent to discuss classificatory characters, since the mosquitoes are not organisms isolated from all other living creatures.

It may be urged, on the other hand, that not being a specialist in the Culicidæ myself, I am not competent as a critic, and that is possibly true. I have, however, studied patiently a dozen or twenty of the so-called new genera of the mosquitoes, and have a more or less critical acquaintance with at least a thousand other genera of Diptera in all families, and I humbly submit that it is not necessary, at least for one whose taste is not depraved, to devour a whole sheep in order to detect the flavor of mutton.

Until within recent years, dipterologists were content to classify the known Culicidæ in a half dozen or so genera, genera which could be defined by characters equivalent to those used for generic definition in the allied families. With the great impulse given to the study of the mosquitoes by the marvellous economic discoveries of recent years, it was only to be expected that many new forms would be brought to light, and new structural characters discovered. The Culicidæ in the past had been generally neglected by students of Diptera, for two chief reasons : the frailty of the insects themselves and the difficulty of preserving them intact, and the recognized difficulties of their study. It naturally was very desirable, with the great influx of new forms, both for scientific and economic reasons, that relationships should be more closely defined than had hitherto been done. The results so far have been that a few new genera, based upon characters equivalent to those previously used, have been established, and that the other old genera have been broken up into scores of groups, to which the designation of genus has been, correctly or incorrectly, applied.

Theobald, in his recent discussion of the genera of the world, recognizes about seventy-five genera, and has promised more. American writers, with no less modesty, have proposed a score or so additional ones.

Altogether, then, perhaps a hundred generic names have been offered for the acceptance of students of Diptera.

Coquillett, in his recent paper on the North American mosquitoes, has attempted to define forty-one genera, eighteen of which contain a single species each, and eight others but two species each. The whole number of species included in these forty-one genera is about one hundred and forty, or an average of about three and a half species to each genus. It might be added, for the encouragement of the genus maker, that there is still room for nearly one hundred genera before each of our species has a generic name all to itself—and there seem to be plenty of characters, such as they are, for the manufacture of these new "genera."

And what is the result? As has been said by others, and as I can corroborate, for the most part it is simplest to determine the species first from their descriptions, and then, of course, the generic determinations are easily ascertained by reference to the catalogues. And there has been not a little guessing done by some of the most prolific writers, as might be shown, were it worth while.

It is Theobald to whom we are indebted for the larger part of the proposed genera. He urged, and rightly, that there were too few genera, for convenience sake. It is very true that, in some other families of Diptera, as, for example, the Tabanidæ, we are not greatly disturbed by large numbers of species in a genus, and even reject many proposed divisions that do not divide. I frankly confess that I am so old-fashioned that a genus means something more to me than an additional name for a species, and do not like to see divisions made on the score of convenience alone. Venational and plastic differences there are few among the mosquitoes; palpal and antennal characters it was thought had been used to their limit; and there seemed nothing left but the character of the vestiture. Theobald insists that he has found trustworthy generic characters in the shape and distribution of the scales of the body and wings. In a measure he may be right, but when it comes to the differentiation of genera, and even subfamilies, by the aid of a few scales alone (*e. g.*, *Phagomyia*, Theobald, "is allied to *Stegomyia*, but is separated by the narrow-curved scales on the lateral lobes of the scutellum"!) whether they are broad or narrow, curved or straight (Theobald lists seventeen kinds of scales), with their countless permutations in the different parts of the body, I protest that triviality has reached its limit. He insists that if a horse were covered with scales instead of hair it would be at once recognized as of a different genus from *Equus*. I have been a student of the vertebrates for thirty

years, and beg to express my decided dissent from such a proposition. If a horse were clothed with scales as large as saucers, with *no structural differences*, it would not be tolerated as a distinct genus. But such examples are hardly pertinent here. A graver charge is that Mr. Theobald believes that palpal characters should not be used, because of the difficulty of detection. In other words, we should not trouble ourselves about natural or genetic characters when they are difficult to observe, but use artificial ones that may be easily seen. However, he urges that the palpal characters are not as true indices of relationships as are the scale characters. This is important if true, but I am bold enough to say that it is not true. In all other families of Diptera the structure of the palpi has been found safe in classification, and it would be strange indeed if the mosquitoes should prove to be an exception. And Mr. Theobald is hardly consistent ; he readily uses certain palpal characters for the definition of subfamilies, but denies to others generic value. And it must be remembered that Mr. Theobald bases his ideas of relationships almost exclusively on scale characters, and it is no wonder that he reasons in a circle. My own conclusion is that characters derived from the shape of the scales are both artificial and inconvenient, and at most only of specific value.

The proposal of a host of genera based upon such trivial characters is bad enough, but words fail me in my expression of amazement at the proposition to base a dozen or more subfamilies almost wholly upon secondary sexual and scale characters. Secondary sexual characters are looked upon universally by taxonomists as of very doubtful generic value, and very rarely have they been accepted. Here we would have them do duty as primary divisional characters in the family. Theobald naïvely says that the males of his Toxorhynchitinæ can not be distinguished from the males of his Megarhininæ, even generically. "The females of the Culicinæ and Ædomyinæ are so alike that, without the examination of the males, it is not always possible to place them in the right subfamily." Coquillett, who has tried to avoid secondary sexual characters in his definition of the subfamilies, separates, for example, his Psorophorinæ and Culicinæ, as follows :

"Femora bearing many outstanding scales ; wing scales narrow ..... Psorophorinæ.

"Femora devoid of outstanding scales (except in the genus *Ædomyia*. which has broad wing scales) ..... Culicinæ."

Of all the writers, one would have thought that Coquillett would have recalled the fate of Brauer's numerous "families" of the Tachinidæ, and have refrained from the use of such trivial characters. Think of it, a subfamily distinguished ultimately by "broad" or "narrow" wing scales!

But this is not the worst, though bad enough. Theobald found a certain specimen with a scaled seventh wing vein, and straightway elevates it to generic and subfamily rank, the Heptaphlebomyinæ! Just imagine that character or its equivalent being used singly as a subfamily character in the allied families!

Nor is this all. Mr. Theobald has suggested, and I regret to see that Coquillett, from whose wide acquaintance with Diptera we should expect better things, adopts the suggestion, that the Corethrinæ should be separated from the Culiciñæ as a distinct family of Diptera; and, ergo, the family Culicidæ be raised to superfamily rank. Because, forsooth, *Corethra*, while identical in venation, bodily structure, larval habits and structure, does not have piercing mouth organs. Imagine such a proposition coming from Loew, Schiner or Osten Sacken! Suppose we apply this criterion elsewhere in the Diptera, and witness the results. *Stomoxys* and its allies become the Stomoxiidæ (and the Muscinæ are only a subfamily at the best); *Ceratopogon* and its allies the Ceratopogonidæ (and the group is far more widely separated from the other genera of the Chironomidæ); *Phlebotomus* the Phlebotomidæ, etc. What a pretty classification we should have if we used the mouth structure alone for family divisions in the Tipulidæ, Chironomidæ, Cecidomyidæ, and the Cyrtidæ, for example. Even the Bombyliidæ, and many of the groups of the Muscidæ, would be stampeded. Coquillett, at least, knows that the three or four "new" families that have been proposed in recent years, all of them with more distinctive characters than the Corethrinæ possess, have been unanimously rejected by dipterologists. How, then, do the culicidologists expect to receive greater consideration? It would almost seem that they consider themselves as without kin to other entomologists, and that whatever they say is, *ex cathedra*, incontrovertible.

There are but two subfamilies of the Culicidæ, unless we admit the Dixinæ, which I strongly favour, the Culicinæ and Corethrinæ, and any groups of either are of lower rank, mere tribes. And we should not want a dozen subfamilies if the genera had not been so debauched.

But discussion is idle. The sanest classification so far is that of Coquillett, but that is not saying a great deal. The family yet awaits a thorough toxonomical revision. Meanwhile my advice to the general student is to ignore all those genera based upon scale characters, and call his species, as of yore, *Culex*, *Ædes*, *Anopheles*, etc.

SOME NEW GEOMETRIDÆ FROM BRITISH COLUMBIA.

BY GEO. W. TAYLOR, WELLINGTON, B. C.

The species described below were all included in a paper on B. C. Geometridæ, which was read by title before the Royal Society of Canada last May.

Unfortunately, it was not possible (owing to pressure of other work) for me to complete the paper in time for publication in this year's volume of the Transactions, and as the names have all appeared in a "Check List of the Lepidoptera of British Columbia," recently published by the Provincial Department of Agriculture, it seems better to print the descriptions now in the CANADIAN ENTOMOLOGIST than to wait the appearance of next year's volume of the Royal Society's Transactions.

1. *Eupithecia olivacea*, new species.—Expanse of largest specimen, 34 mm. Palpi short, slender, drooping, black, the tip pale. Head, thorax, abdomen and fore wings a uniform dark olivaceous brown; summit pale, with a dark central spot.

Fore wings lengthened, with outer margin very oblique, scarcely rounded; all markings obscure except the discal spot (which is black and conspicuous) and the scalloped white submarginal line.

The veins, especially veins 2 to 6, are marked with black dashes, indicating two or three extra-discal lines. There is a fine, faint, black marginal line, followed by a pale line at base of fringe; fringe rather paler than wing, with dark spots at the ends of the veins.

Hind wings rather broad, with a slight flattening of outer margin at vein 5; a little paler in colour than the fore wings.

Beneath, fore wing uniformly dusky; discal spot obscure, veins slightly marked with blackish, indicating extra-discal lines; marginal line distinct.

Hind wings as fore wings, but discal spot more distinct, and two extra-discal lines showing as dots on the veins across the wings; marginal lines as above.

This species is very close to *E. lachrymosa*, Hulst, as identified by me, but differs in the duller and more uniform colouring, the lengthened fore wings and straighter outer margins.

Types: ♂, Wellington, 7th April, 1903; ♀, Wellington, 20th April, 1903. It is not very rare at Vancouver (R. V. Harvey) and Wellington, but I have not yet received it from other parts of the Province.

2. *Eupithecia Harveyata*, new species.—Expanse, 25 mm. Palpi long, slender, porrect. Head, front, thorax and ground colour of wings, gray, with a light brown shade; a small brown spot in front of each antenna.

Fore wings with many fine cross lines, most distinctly seen at their terminations on the inner margin. Three of these lines are basal; the intra-discal is double; there are two faint wavy lines in the discal space, one on each side of rather large and distinct round black discal spot.

The extra-discal band consists of three black lines and two included pale spaces. The inner line of the three is marked with black dashes running inwardly on the veins; middle line less distinct, wavy; outer line also fine and wavy. Submarginal space dusky, divided by a conspicuous white scalloped line; marginal line of indistinct black dashes; fringe pale, with blackish mottlings.

Hind wings, with outer margin full; discal spot very small; the beginnings of about six lines on the inner margin, the two extra-discal lines being traceable half across the wing, the others being much shorter; submarginal space dusky; submarginal and marginal lines as on fore wings; fringe rather long, the colour of the fore wings, cut with a darker shade at the ends of the veins.

Beneath, all the wings are clear gray, with the discal dots and marginal black lines distinct. There are also two extra-discal faint lines on each wing, those on the fore wings being diffuse, and showing most plainly as rather large smoky blotches on the costa.

Abdomen gray, with brown mottlings, much paler beneath.

The type specimens, and the only ones I have seen, are two, ♂ and ♀, taken at Vancouver on 6th April, 1903, by Mr. R. V. Harvey, the energetic secretary of our B. C. Entomological Society, after whom the species is named.

3. *Eupithecia Dyarata*, new species.—Expanse, 25 mm. Palpi long, stout, porrect. Head, thorax and fore wings rather dark brown. Abdomen brown, with second segment darker.

Fore wings crossed by numerous undulating blackish lines; basal line diffuse, very indistinct; angled sharply at cell; one or two dark lines within basal space; intra-discal line double, fine, with very distinct angle at cell; discal space rather darker than the rest of the wing, especially on the costa; two or three faint cross lines are included in the discal space, and a very small, hardly visible,

discal spot. Extra-discal line double, the inner one being most distinctly marked, especially on the veins. It runs inwardly from costa to vein 8, then outwardly to vein 6, then in an almost straight line to inner margin. This line is followed by a pale band, then a darker submarginal space rather wider than usual. Submarginal line indistinct, finely scalloped, with black marks on inner sides of scallops. Marginal line black, narrow. Fringe rather long, basal half darker, with dusky spots at ends of veins.

Hind wings with margin slightly flattened at vein 5, paler than fore wings, but sprinkled with numerous dusky scales ; five straight diffuse dark lines cross the wing from inner margin to cell ; a sixth wavy extra-discal line completely crosses the wing, and this is followed by the submarginal space and white submarginal line as on the fore wings ; discal spot very faint.

Beneath bright gray, costa of fore wings marked with about eight dark spots, indicating commencements of lines as on the fore wings, but the lines are diffuse and indistinct, and become obsolete before reaching inner margin ; discal spots distinct, rather large.

Hind wings with six dark lines, two intra- and four extra-discal, discal points very small, but distinct.

Type, 1 ♂, Kaslo, 24, iv, 1906, received from Mr. J. W. Cockle.

The species is not uncommon at Kaslo from the middle of April to the end of May. Dr. Dyar recorded it in his "Lepidoptera of Kootenai" as *Eupithecia multistrigata*, Hulst, a species to which it bears a superficial resemblance.

4. *Eupithecia Hanhami*, new species. Expanse, 28 mm. Palpi short and stout, dusky ; pectus gray.

Front gray, with a black spot in front of each antenna, and some blackish scales on clypeus. Thorax light gray, with a conspicuous black transverse bar in advance of the middle, posterior thoracic tuft blackish.

Abdomen dark gray, with the first, third and terminal segments and the median line on 4th and following segments lighter; dorsal tufts black.

Fore wings slightly lengthened, bright gray ; cross lines distinct, black. Basal line narrow ; intra-discal line double ; median line also double, angled so as to pass outside the discal dot, which is distinct, large and round. Extra-discal line marked by a series of short dashes on the veins ; this is followed by a pale band, brighter than the ground colour of the wing, divided into two by a narrow blackish line, and followed by another line indicated by a row of black dots on the veins ; submarginal

space darker gray, with a submarginal zigzag white line; a marginal line of black dashes; fringe dusky, with darker spots at ends of veins.

Hind wings dark gray, much paler on costal area; there are traces of five or six dark lines on inner margin; the extra-discal line shows as an irregular curved line of dots on the veins, extending to the costa; a zigzag submarginal line, distinct and reaching nearly to the costa; this is followed by a paler space, and this again by the submarginal space, which is darker; marginal line and fringe as on the fore wings; discal spot a distinct black point.

Beneath smoky, with the costa of fore wings paler; discal spot lengthened, black; extra-discal line marked by a blackish blotch on the costa; inner boundary of subterminal space marked by a line of black dots on veins, extending across fore and hind wings; a pale submarginal line; marginal line and fringe as above.

Hind wings with distinct discal dot; an incomplete basal and a faintly-indicated extra-discal line; the distinct submarginal line of black dots as on fore wing.

Types, two specimens taken by Mr. A. W. Hanham at Victoria, on fifth June, 1903, and 25th June, 1905, respectively.

5. *Eupithecia Bryanti*, new species.—Expanse, 18 mm. Palpi moderate, rather stout, terminal joint deflected.

Front, thorax and all wings of a dark smoky brown, with the cross lines very faintly indicated; abdomen of the same colour, with the dorsal line paler and the dorsal tufts black; abdomen paler beneath.

Fore wings with basal and intra-discal lines indeterminate; indications of a double extra-discal and a submarginal line; a dark marginal line and a small, round, black discal dot.

Hind wings of exactly the same colour as fore wings, with a small discal dot and indications of five cross lines; the first intra-discal, the second including the discal dot, and the other three extra-discal, rather thick, wavy, the interspaces pale; marginal line as on fore wings. There is an evident indentation in the margin of the hind wings, between veins 5 and 6.

Beneath even, smoky, all the lines showing almost as plainly as above.

Type, 1 ♀, taken 22nd July, 1905, on the international boundary line near the Stickeen River, B. C., by Mr. Theodore Bryant.

I have also six cotypes before me, taken at the same place, and dated 13th to 29th July, 1905. Mr. Bryant reports the species as very common.

6. *Eupithecia obumbrata*, new species.—Expanse, 20 mm. Palpi short and bushy.

General colour of head, thorax, abdomen and wings above a soft smoky gray, without any brown tinge in the type specimens.

Fore wings with the costa very straight; the inner margin is also straight and rather long, and the outer margin is well rounded from the tornus to vein 4, and thence almost straight to the apex.

The markings are not easy to trace in the type specimens, which are in very good condition, but in a specimen that is a little worn it can be seen that the basal space is separated from the median by a double pale line, and that in the same way the discal and submarginal spaces are separated by a similar double line or band. In the discal space there is a pale double line curving regularly out from costa to vein 3 (just missing the very small, but distinct, discal dot), and thence in a wavy line to the inner margin. The extra-discal double line is parallel to this. The submarginal white line is hardly discernible in any specimen I have seen, but its termination is marked by a very distinct single white dot at anal angle, marginal line black; fringe with a pale line at the base, then a row of dark spots almost contiguous, outer half of fringe paler.

Hind wings uniformly dark smoky gray; cross lines indicated by pale marks on the inner margin, and a few black dots on the veins; fringe as on fore wings.

Abdomen dark gray, dorsal line paler, two dark spots on each segment, one on each side of dorsal line.

Beneath, fore wings smoky, without markings basally; the median line is marked by two whitish spots on the costa; a submarginal line is faintly indicated.

Hind wings paler gray, with dusky scales, and with about six dusky brown diffuse lines crossing the wing; discal dots minute black specks.

Types, two females, both taken on 10th May, 1903, at Goldstream, near Victoria, by Mr. A. W. Hanham. This species is nearly allied to *E. scriptaria*, Herr. Sch., and to *E. Regina*, Taylor, also to *Eup. modesta*, described below, but it is, I think, distinct from them all.

I have seen several other specimens taken at Goldsteam, and at other points in the neighbourhood of Victoria. The dates run from 30th April to June 6th.

7. *Eupithecia modesta*, new species.—Expanse, 21 mm. Palpi rather long, not very heavily scaled.

Head, thorax and fore wings above, blackish brown.

Fore wings with all the margins well rounded ; basal and intra-discal lines indeterminate ; extra-discal line pale, double, wavy, very faint, marked inwardly by feeble dark points on the veins; submarginal line pale (not white, as in so many species), running from the costa in four distinct scallops, until it almost touches the marginal line, then parallel to outer margin, but much less distinct, to anal angle.

Hind wing similar in colour to fore wing. Outer margin rather straight, with slight indentation at vein 5 ; cross lines not evident ; fine black marginal lines and dotted fringe on all wings.

Beneath paler, markings of upper side reflected faintly ; three dusky lines cross the fore wing, one just within the discal dot, the second just without it, the third much broader. There is also a submarginal dusky line.

Hind wing, two intra-discal and three extra-discal dusky lines; small, inconspicuous discal dots on all wings.

Abdomen brown above, with a pale dorsal line, most conspicuous on the first segment ; beneath light gray.

Types, two specimens, ♂ and ♀, taken by myself in Stanley Park, Vancouver, on 6th June, 1905.

8. *Eupithecia insignificata*, new species.—Expanse, 21 mm. Palpi long, moderately stout, gray above, darker at sides and below.

Head, thorax and fore wings above, clear gray.

Abdomen a little darker, but with median line, a line at extreme base and the whole of the terminal segment, paler ; dorsal tufts distinct, black.

Fore wing crossed by many fine blackish lines ; basal line (and two within it) and double intra-discal line, gently rounded ; discal space with two included lines, curving outward to pass outside the small black discal dot ; extra-discal coming out from costa (where it is very distinct) to cell, then in an irregular course (general direction almost straight) to inner margin. This line is marked on the veins by dashes directed inwards. Beyond the extra-discal line is a pale space, divided by a faint hair line, and bounded outwardly by a second hair line, both these lines being parallel to the extra-discal ; submarginal space darker, with faint indications of the usual submarginal pale line ; a marginal line of dashes, very faint ; fringe long and silky, pale, cut with darker shade at the ends of the veins.

Hind wing clear gray on the costa ; indications of five or six dark lines on inner margin ; only one, the submarginal, running almost across the wing ; marginal line and fringe as on the fore wing ; discal dot minute.

Beneath silvery gray, with two extra-discal lines appearing on all the wings ; those on the fore wings arise from rather large dusky spots on the costa ; those on the hind wing are represented by dots on the veins. Discal spots distinct on all the wings; fringes and marginal lines as above.

This species is a rather common one, appearing very early in the year (about the middle of March), at Sallow bloom, and continuing on the wing until about the end of May. It has been taken at Wellington, Victoria and Vancouver. The specimen I have marked as type is one in very perfect condition, and was taken by me at Wellington on 15th April, 1904.

9. *Eupithecia sublineata*, new variety?—This is a form occurring with *E. insignificata*, but differing from that species in having the fore wing longer and narrower, and the outer margin straighter. The discal spot on the fore wing is larger, and the marginal lines on the under sides of the wings are heavier.

It is quite likely that this may be a distinct species, but perhaps for the present it will be better to consider it as a variety of *E. insignificata*.

The specimen I have marked as type is labelled Wellington, 18th April, 1904.

10. *Eupithecia perbrunneata*, new species.—In Dr. Dyar's paper on Kootenai Lepidoptera (Proc. U. S. Nat. Mus., xxvii, p. 890), he writes : "A specimen in Mr. Cockle's collection comes near the European *lariciata*. The markings are more pronounced and contrasted, the outer pale band being broader and less obscured by its centering line. The discal dots on both wings are well marked."

I have seen this specimen, and have two others quite like it from Kaslo, and also a specimen taken by myself at Victoria many years ago.

I have compared them carefully with British specimens, received through the kindness of Mr. Prout, and am quite satisfied that our B. C. species is not *lariciata*. This name must, therefore, be struck off our list, and *Eupithecia perbrunneata* substituted. The species may be described as follows :

Expanse, 23 mm. Palpi moderate, rather stout, dark brown.

Head and thorax brown of various shades, the front being the darkest and the collar the palest.

Abdomen above pale brown, the second segment darker, the dorsal tufts black, tipped with white.

Fore wings rather long, the costal margin being at least one and a half times as long as the inner margin ; outer margin well rounded. The fore wings are lightly scaled, the scales being brown, with a tinge of ochreous; there are traces of three or four diffuse lines in the basal area, but the form of them cannot be made out clearly in any of my specimens. The first distinct line is the intra-discal ; this is followed by a median line, bent outward to pass the discal spot, and an extra-discal line. These three lines are parallel to each other, and are all of them very distinct on the costa, where they appear as conspicuous blotches. The extra-discal line is punctuated on the veins by dashes pointing inwards. The discal spot is large and darker than the other markings of the wing.

Beyond the extra-discal line is a pale band, widest on the costa, and divided by a fine hair line ; the submarginal space is darker than the rest of the wings, and is a little wider than usual. The submarginal wavy pale line is conspicuous on the costa ; on the inner side of it on the costa is a double brown blotch; the line itself, though distant nearly 2 mm. from the apex of the wing at its commencement, almost touches the outer margin at the tornus.

There is a marginal line of rather heavy dashes between the veins ; the fringe is long, pale at the base, but with darker spots on the median line.

Hind wings, clear in the costal region, but with six brown lines marked on the inner margin, only one of which extends beyond the middle of the wing ; discal dots well marked ; fringe as on fore wing.

Beneath, fore wings clear at the base, and along inner margin ; the commencements of the median and extra-discal lines appear as blotches on the costa, and there is also a large dark apical blotch, corresponding with the costal portion of the submarginal band of the upper side, and this is divided by the reflection of the pale submarginal line.

Hind wings with traces of four cross lines, two intra-discal and two extra-discal, the outermost extra-discal line being marked by rather long dashes on the veins.

The discal dots on all wings as above, but those on the fore wings are rather smaller, and those on the hind wings rather larger than on the upper side.

The three type specimens mentioned above are labelled respectively Kaslo, 23rd May, 1904; Kaslo, 2nd June, 1904, and Victoria, 9th May, 1888.

11. *Eucymatoge Vancouverata*, new species.—Expanse 25 to 30 mm. Palpi long, stout, deflected, dark brown.

Front and anterior portion of thorax paler brown; the rest of the thorax darker, with a transverse white bar in front of the middle. Patagia gray.

The wings have a very variegated appearance, the ground colour and colour of the lines ranging from bright chestnut, through many shades of brown, to nearly black.

Abdomen mottled gray and brown, second segment with a black transverse band; dorsal abdominal tufts blackish.

Fore wing with basal line very near to the base, strongly angled at the cell; discal space bounded inwardly by three dark brown wavy lines, running out from the costa to vein 8, then at right angles to the inner margin.

The discal space is of various shades of brown and gray, darker in the neighbourhood of the intra- and extra-discal lines, and much paler around the large, linear, bright brown discal spot. There are three brown lines in the discal space, all more conspicuous on the costa.

The extra-discal line is distinct, dark brown, parallel with the intra-discal, shaded within, and marked with darker dashes on some of the veins; paralleled outwardly by two other dark brown wavy lines; a bright, distinct, white zigzag submarginal line, edged inwardly with dark brown; submarginal space of a grayer shade, with the veins darker; a thin, black, marginal line; fringe pale, with dark spots at ends of the veins.

Hind wing well rounded, crossed by about seven dark lines, sometimes extending almost to the costa; submarginal line not nearly so distinct as on fore wing; marginal line and fringe as on fore wing; a small dark discal point.

Beneath smoky, fore wing showing traces of lines beyond discal spot.

Hind wing with about five lines, showing mostly as spots on the veins; discal spots distinct, those on the fore wings being smaller and those on

the hind wings larger than those on the upper side ; marginal line and fringe as above.

Legs and under side of thorax and abdomen pale.

This is a very fine species, belonging to the same group as the *Eucymatoge Grœfii* of Hulst, as identified by Dr. Dyar, but differing from that species in having the discal spots on the fore wings bright brown instead of black.

I have before me many specimens taken at Wellington between 10th April and 24th August, these dates appearing to indicate two broods. The specimen I have marked as type is labelled Wellington, 3rd July, 1903.

12. *Eustroma Harveyata*, new species.—Expanse, 34 mm. Palpi moderate, not very stout, porrect.

Front and thorax purplish brown.

Fore wings, which are of the same size and shape as in *Eustroma destinata*, Moeschler, are bright yellow, with the markings purplish brown.

Basal line strongly angled at cell ; basal space purplish brown, with traces of two darker included lines ; space between basal line and median band yellow, about 2 mm. wide, with a central purple shade.

Median band purple brown, a little wider on the costa, where it occupies more than one-third of the wing, than on the inner margin ; two cross lines within this band show as yellow marks on the costa, and again faintly on the inner margin ; the inner edge of the median band is parallel to the basal line ; the outer edge forms a slight outward curve from the costa to vein 5, then three blunt scallops pointing outward between veins 5 and 4, 4 and 3, 3 and 2 (the scallops projecting considerably into the extra-discal space), then three smaller scallops in a nearly straight line to the inner margin.

The extra-discal space is yellow, with a submarginal scalloped line of a paler shade, the inner side of each scallop marked with purple ; a purplish lunule on outer margin, below apex of wing.

Hind wing with basal two-thirds purple, with two darker lines, one median and the other bounding the purple ; the outer portion of the wing is yellow, with a zigzag purple submarginal line ; marginal lunules purple.

Beneath, the markings of the upper side are reflected, but the whole of the fore wing, to extra-discal line, is purple, and on the hind wing there is a small purple discal spot, not visible on the upper side.

This species was first taken by Mr. R. V. Harvey, in Stanley Park, Vancouver (11th July, 1904), and has since then been taken in the same locality by other persons.

I have also seen a long series of specimens taken by Mr. T. Bryant, near the Stickeen River. The species also occurs, I think, at Kaslo, and is recorded in Dr. Dyar's "Lepidoptera of Kootenai" under *Eustroma populata*.

The type specimen is a male, labelled "Stickeen R., July 28th, 1905, T. Bryant."

This species is a near ally of the *E. destinata* of Moeschler, and might turn out to be a colour variety of that species.

13. *Zenophleps Victoria*, new species.—Expanse, 30 mm. The species is very nearly allied to *Z. lignicolorata*, Pack. From that insect it differs in the ground colour, which is a very pale coffee colour (as in the "*Ochyria Gueneata*" of Packard), quite different to the usual gray or wood brown of *Z. lignicolorata*, and in the form of the extra-discal line on the fore wing. This line in *Z. lignicolorata* leaves the costa with an outward curve, and has a large tooth projecting outwards between veins 2 and 5. In *Z. Victoria* the whole line is almost straight in its general direction, and has only a very slight projection at vein 4, in place of the prominent tooth.

I have only seen two specimens, both taken by Mr. A. W. Hanham near Victoria. One of these, which is a ♀, dated 29th August, 1901, he has generously placed in my collection, and I have labelled it as the type of the species.

14. *Hydriomena autumnalis*, Strom.? var. *Columbiata*, new variety.—Expanse, 40 mm. I propose this name for a form which has so far been taken only on Vancouver Island, and which is nearer to some of the lighter varieties of the European *autumnalis* than to any of our characteristically western Hydriomenas.

It differs from *autumnalis* in the larger size and the proportionately longer wings, in the clearer, pale greenish ground colour, and the more distinct lines and bands, which in their form and direction are very nearly as in *H. autumnalis*.

It would, perhaps, not be worth while to give this form a distinctive name, but for the fact that it differs very materially from another form common in the Stikeen region, which appears to represent typical *autumnalis* in this Province.

The insect usually labelled *H. autumnalis* or *H. trifasciata* in western collections is, in my opinian, *Hydriomena ruberata*, Freyer, a name which must now be added to our North American lists.

My four specimens of *H. Columbiata* are dated Victoria, 29th March, 1903, and Wellington, 16th, 23rd and 27th May, 1904. The one taken on the 16th of May bears the type label.

15. *Hydriomena manzanita*, new species.—Expanse, 43 mm. Palpi short and stout, deflected.

Antennæ of male thickened, very finely ciliate below. Head and thorax dark slate colour. Abdomen pale brown.

Fore wings, costa strongly bent at base, rather straighter than usual for the remainder of its length; colour of wing slate gray, with a bluish tinge in some places. Cross lines very indistinct.

Basal line acutely angled on median vein; intra-discal line directed outward from costa to median vein, where it is twice as far from the base as at its origin on the costa; thence at right angles to inner margin. Extra-discal line rather wide, evenly curved outwardly from costa to inner margin, and marked on the veins with black dashes; submarginal shade smoky gray, three times as wide at the costa as on the inner margin.

There is a bluish shade on the inner side of the extra-discal line, extending from the costa to the median vein, and a blotch of the same colour on the costa beyond the extra-discal line; there is also a faint submarginal line of the same colour dislocated and enlarged at the costa. In very fresh specimens there is sometimes a narrow line of this blue colour bordering the extra-discal line on both sides, and the submarginal shade on its inner margin. Fringe short, of the ground colour of the wing.

Hind wing sickly pale brown, lighter basally, with a darker median line and broad submarginal band.

Beneath without markings, fore wing smoky, hind wing pale brown.

This is a very distinct species, not likely to be confused with any other American form. I have found the larvæ commonly feeding concealed between the leaves of the Arbutus tree. The perfect insect emerges from the pupa early in April, and continues on the wing until the first week in May. It has not so far been found on the mainland of B. C., but is not rare on Vancouver Island.

The type specimen is a ♂, labelled Wellington, 21st April, 1903.

16. *Xanthorhoe pontiaria*, new species.—Expanse, 35 mm. This species, together with the next to be described, passed in the old

collections as *X. fluctuata*, and it may be best described by comparing it with that species. *X. fluctuata* is one of the commonest of the European Geometridæ, and is also abundant in the eastern part of this continent. I have, therefore, been able to secure a fine series for comparison.

X. pontiaria is larger and paler, and the median band is not nearly so black and contrasting as in *fluctuata*. The intra-discal line in *pontiaria* is even and regular in its course (as in *X. defensaria*, for instance), while in *fluctuata* it is very irregular, encroaching on the median band at the veins, particularly at vein 8. The extra-discal line in the same way has many sharp angles in *fluctuata*, which angles are all rounded off in *pontiaria*.

In fresh specimens of *pontiaria* there is a slight tinge of pink in the central band, which is never seen in *fluctuata*.

I have four good specimens of *pontiaria* before me, namely, one male, Salem, Oregon, 2nd June, 1904, and three females, Wellington, 20th June, 1905; 26th June, 1904, and 23rd May, 1905. The last named I have labelled as a type.

17. *Xanthorhoe fossaria*, new species.—Expanse, 35 mm. This is a species somewhat nearer to the *munitata* group than the one last described.

It has been sent to me from Laggan, 6,850 feet altitude, and from Mount Cheam, B. C., having been taken in the former locality by Mr. F. H. Wolley Dod, and in the latter by Messrs. Harvey and Bush. It is evidently a mountain-loving species, and the scaling of the wings is of that peculiar hairy character so often seen in forms from high altitudes or extreme northern localities.

The wings are long, rather narrow and pointed, the inner margin being shorter than in *munitata* and its allies.

The colours are dull, and all the markings are obscure, the usual lines being present, but not easily made out. There is a dull pinkish shade overspreading the median band. The intra-discal line is much straighter than in *convallaria* or *nemorella*.

The marginal line is made up of almost contiguous black dashes, not of distinct dots in pairs, one on each side of each vein, as in *fluctuata* and *pontiaria*; and the fringe is dusky, with a darker line centrally, and lacks the dark spots at the ends of the veins, which are so distinct in the two species last named.

I have before me four specimens, three males and one female, from Laggan, Alberta, all dated 20th July, 1904, and two others, both males, from Mt. Cheam, B. C., dated 5th August, 1903 (Mr. A. H. Bush.)

One of these Cheam specimens bears my type label.

18. *Leptomeris subfuscata*, new species.—Expanse, 30 mm. The whole insect, except the front, which is a little darker, is of soft warm fawn colour, of a much redder tint than the common *Eois inductata*.

On the fore wings are three distinct lines, darker than the ground colour; the intra-discal and median lines are heavy and diffuse, running out at a sharp angle from the costa for a very short distance, and then in a nearly straight line parallel to the outer margin, to the inner margin. The extra-discal line is narrow, distinct, wavy, darker than the other lines, parallel to them.

The submarginal space is divided by a pale wavy line, parallel to the outer margin of the wing; the fringe is concolorous with the submarginal space, from which it is separated by a very fine and faint black marginal line.

All the lines of the fore wings are continued on the hind wings, but the median and extra-discal lines are here rather farther apart.

Beneath the basal line is absent, but all the other markings are as above, only much more distinct than on the upper side.

The discal points are usually absent (not always) above, but are quite distinct beneath.

I have seven males and two females of this species.

The types, ♂ and ♀, were taken at Goldsteam, near Victoria, by Mr. A. W. Hanham, on 24th May, 1902, and 7th June, 1903, respectively. I have another pair from Goldsteam dated 7th June and 26th June; three males from Victoria, 30th May, and three males from Vernon, sent to me by Mr. R. V. Harvey, who took them on the 11th and 15th August, 1904.

This species stood in our collections for a time as *Eois inductata*, and later as *Cinglis fuscata* (which does occur also in B. C.), but the generic characters will serve to distinguish it from either of these species.

19. *Deilinia Bryantaria*, new species.—Expanse, 30 mm. This species belongs to the same section as *D. erythemaria* and *D. pacificaria*.

It seems at first sight to be very near to the last named, but it differs in the following particulars:

The front is not ochreous, but white, with a blackish bar in front of the antennæ, as in *Diastictis*.

The wings are a little shorter and wider than in *pacificaria*, and are dusted all over quite thickly with cinereous specks, not striæ, as in the two species above named. The cross lines on all wings are faint, but appear to be more evenly rounded and less wavy than in *erythemaria* and *pacificaria*.

Beneath, the dense dusting gives a very different appearance to the scattered strigations in the other species.

This species was found by Mr. T. Bryant, on the international boundary line, near the Stickeen River, in the early part of June, 1905. He reports the species as being rather common.

The type specimen in my cabinet is dated 13th June, 1905, and is a ♂.

20. *Enypia Packardata*, new species,—

= *Cleora umbrosaria*, Packard, Monograph, p. 453, and Pl. xi, fig. 33, 1876 (part);

not *Cleora umbrosaria*, Packard, Proc. Bost. Soc. Nat. Hist., xvi, 23, 1874.

Packard described *Cleora umbrosaria* in 1874, from one male, received from Hy. Edwards, and taken in California. He distinctly states that the antennæ were "*broadly pectinated*." Had it not possessed this character he would certainly not have placed it in the genus *Cleora*.

In his Monograph, two years later, Packard republishes his description, but speaks of having at that time *four* males, two at least being from Vancouver Island, collected by Crotch.

One of these Vancouver Island specimens he figures, and strangely enough depicts it with *pectinated antennæ*. But whether Packard's original Vancouver Island specimens had pectinated antennæ or not, it is quite certain that no such specimens exist in our collections to-day. I am quite prepared to believe that the original Californian type of *umbrosaria* had, as Packard states, broadly pectinated antennæ, and though for the moment the species has been lost sight of, it will, I am confident, some day be rediscovered, but our B. C. species cannot be the same, and, therefore, needs a new name.

It is not a *Cleora*, nor is it a *Nepytia*, as Hulst styles *umbrosaria* in his latest catalogue, for in both these genera the males have fully pectinated antennæ, but it is a near ally of *Enypia venata*, and like that species has in the male simple, slightly-thickened antennæ.

I propose to call it

Enypia Packardata, new species.—Expanse, 40 mm. Palpi short, third joint deflected.

Front and vertex grayish white; antennæ dark gray, slightly thickened in the male.

Thorax smoky gray ; abdomen above, white.

All wings pale gray, with numerous dark gray striations.

Fore wing crossed by two scalloped blackish lines ; the intra-discal consists of four scallops rounded outwardly ; this line has its origin on the costa, nearer the base than usual, and reaches the inner margin about one-third out from base. The extra-discal line leaves the costa about 2 mm. from the apex, and reaches the inner margin at about double that distance from the anal angle. It consists of a series of scallops, rounded inwardly, but produced outwardly as points or dashes on the veins. The scallops between veins 1 and 2, and between veins 4 and 6, are much larger than the others. There is no marginal line; the fringe is concolorous with the wing, with dusky points at the ends of the veins.

Hind wing similar in colour, but with only the extra-discal line present.

Discal spot, on fore wing lengthened, on hind wing an indistinct point.

Beneath paler ; space between vein 2 and the inner margin of fore wing quite clear of striæ ; discal spot and extra-discal line faintly indicated on the fore wing, the line showing most strongly in three black spots below costa ; the dots on the fringe at the ends of the veins are blacker and much more distinct below than above.

This species is well figured (except as regards the antennæ, which are quite incorrect) in Packard's Monograph, Pl. xi, fig. 33.

I have described it from six specimens, all taken at Wellington, and dated June 20th to August 16th. The earliest specimen, a male, is indicated as type.

A female specimen from Mt. Cheam, B. C., given to me by Dr. Fletcher, differs in having all the cross lines bordered with a dusky shade, and in being brown instead of gray in all markings.

All the types referred to in this paper are in my own cabinet.

Eupithecia Youngata, n. sp.*—Expanse, 25 mm.—Palpi not very long, bushy, blackish.

*Reprinted by request from "The Ottawa Naturalist," Vol. XIX, No. 12, March, 1906, pages 226-7.

Front dusky, cinereous. Thorax brown, with a dark transverse band anteriorly. Abdomen as thorax, 2nd segment a little darker, posterior edge of each segment whitish.

Fore wings obtuse at apex, outer margin well rounded, same colour as thorax, the costa rather darker and the cross lines distinctly lighter than the ground colour; basal line double, very irregular, being angled sharply outwardly at cell and below vein 2; median line also double, not well marked, making a sharp outward angle to include the conspicuous black discal dot, then running in an almost straight line to middle of inner margin; extra-discal line also double, dislocated at vein 6, then in a regular curve parallel to outer margin; both median and extra-discal lines show in more or less well defined whitish spots on veins 2 to 6 inclusive; and there are short black dashes on each of these veins between the median and extra-discal lines; submarginal line white, conspicuous, regularly scalloped at each vein, and forming a distinct V at anal angle; a fine black marginal line; fringe dotted with dark brown between veins.

Hind wings well rounded, lighter brown than fore wings, with six darker lines; the first two are basal, and do not extend further from inner margin than to vein 2; the next two lines are extra-discal and almost complete; the two outer lines extend completely across the wing; a very small and faint discal dot; marginal line and fringe as on fore wings.

Beneath paler; fore wings with a linear discal dot, and the extra-discal markings of the upper surface reproduced; basal portion of wings without markings except a dark spot on the costa, indicating the position of basal line.

Hind wings as above, but with all the lines more regular, and reaching to the costa; the discal spot is distinct, black; first extra-discal line is diffuse and very evident; the three outer lines appear as spots between the veins, the outermost line being least conspicuous. The under side of thorax and of the basal segments of the abdomen is very pale, almost white, but the posterior portion of the abdomen is nearly black.

Type, one specimen, Meach Lake, Ottawa, 7th June, 1905, C. H. Young. Co-types, two specimens, Catskill Mountains, 2nd and 10th July, 1901 (No. 1), R. F. Pearsall. Named after Mr. Young, from whom was received the very beautiful and absolutely perfect specimen which is designated the type of the species.

NOTES ON HEMIPTERA TAKEN BY W. J. PALMER, NEAR LAKE TEMAGAMI, ONT.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

These notes refer to a small but interesting collection of Hemiptera taken about Lake Temagami in August, 1906, by my friend, Mr. William J. Palmer, of Buffalo. Before starting for a brief vacation trip to northern Ontario, Mr. Palmer very kindly offered to collect Hemiptera for me as time and circumstances would permit. On four days only was he able to do any collecting, but considering the unfavourable conditions, the results were remarkably good, both as to the amount and character of the material brought home. This material represents sixty-two species, including several very interesting forms, and four that may prove to be still undescribed. Among the more interesting species taken may be mentioned *Plagiognathus annulatus*, Uhler, *Dræculacephala Manitobiana*, Ball, *Thamnotettix eburata*, Van Duzee, *Thamnotettix waldana*, Ball, *Thamnotettix Smithii*, Van Duzee, and *Cicadula lepida*, Van Duzee. In the case of five of these six species the known range has been considerably extended. The rediscovery of *Thamnotettix eburata* shows conclusively that this is a boreal species, probably having the southern limit of its range in the Adirondack Mts. It is not unlikely that it will yet be found in the White Mts., and possibly elsewhere in northern New England.

The particular localities where collections were made by Mr. Palmer, and the dates, are as follows : Red Cedar Lake, August 9th : Fox Island, at the other end of Red Cedar Lake, on August 10th ; the lumber camp on Island Lake, August 12th ; and Swamp Creek, August 14th. All of these places are within forty or fifty miles of Lake Temagami, in a south-easterly direction.

Banasa dimidiata, Say.—One large and deeply-coloured example was taken at the Island Lake lumber camp on August 12th.

Podisus serieventris, Uhler.—One fine large specimen from Red Cedar Lake, August 9th. As stated in my Annotated List of North America Pentatomidæ, I distinguish this species from *maculiventris* by the short ventral spine, less acute humeri, etc. The present example is fully as large as any I have seen of *maculiventris*, and is much more deeply coloured, with the wings of a rich metallic green, and some of the punctures, especially on the pronotum, tinged with the same colour.

Ligyrocoris contractus, Say.—One specimen from Red Cedar Lake, August 9th, and one from Swamp Creek, both females. I have this

species from Lake Placid, in the Adirondacks, and from Montreal, and what is probably the same species was taken at Beulah, N. M., by Dr. Henry Skinner.

Corythuca, sp.—This is the most abundant Tingid throughout the northern States and Canada. It is closely allied to *arcuata* and *juglandis*, and is the "small variety" of *arcuata* mentioned in my list of Muskoka Hemiptera. Ten examples from Fox Island and one from Swamp Creek are in this lot.

Coriscus incriptus, Kirby.—Island Lake lumber camp, August 12th.

Coriscus vicarius, Reut.—Taken at Island Lake and Red Cedar Lake. This species seems to be common toward the north. I took it in abundance at Lake Placid, in the Adirondacks. I cannot follow Kirkaldy in placing this as a synonym of *Coriscus propinquus*, Reut.

Miris affinis, Reut.—Taken at all localities.

Phytocoris eximus, Reut.—Swamp Creek, August 14th.

Phytocoris pallidicornis, Reut.—Red Cedar Lake. Several examples.

Lygus, sp. nov.—Swamp Creek, August 14th. A very pretty red species.

Lygus pratensis, Linn.—Apparently common with its variety *flavonotatus*, Prov.

Lygus invitus, Say.—Several taken at Island Lake lumber camp, August 12th.

Lygus pabulinus, Linn.—A few with the preceding.

Pœcilocapsus lineatus, Fabr.—One example from Fox Island, in Red Cedar Lake.

Monolocoris filicis, Linn.—Apparently common.

Neoborus, sp. nov.—Island Lake, August 12th, and Swamp Creek.

Macrolophus separatus, Uhler.—Island Lake, August 12th, three examples. These differ from specimens from Maryland and Florida now in my collection, in being proportionately longer and more slender, with the colours somewhat paler and the markings more clearly defined. What seems to be a smaller form of the same species I found in numbers on bushes at Gordon Town, near Kingston, Jamaica. This would give the species a very wide distribution. It is a pretty insect, and closely resembles *Dicyphus*.

Rhinocapsus Vanduzei, Uhler.—One specimen was taken at Red Cedar Lake, August 9th.

Orthotylus chlorionis, Say.—Several from Red Cedar Lake and Island Lake.

Plagiognathus obscurus, Uhler.—Several large and clearly-marked examples of this common species were taken at the several localities.

Plagiognathus politus, Uhler.—Swamp Creek, August 14th, and Island Lake.

Plagiognathus annulatus, Uhler.—A very black little species, of which two examples were taken at Island Lake, August 12th. Kindly determined for me by Mr. Otto Heidemann.

Ceresa brevicornis, Fitch.—One small male was taken on Fox Island in Red Cedar Lake. Mr. Palmer kept a close watch for the Membracidæ, but this was the only species taken.

Otiocerus Coquerberti, Kirby.—One pair of this pretty species was taken at Island Lake, August 12th. The elytra are more suffused with yellow than in the specimen from western New York.

Cixius stigmatus, Say.—Apparently abundant. In this material there is a conspicuous blackish vitta before the middle of the elytra in the female. The male elytra shows but faint traces of this maculation, but in both sexes there is a fuscous spot on the stigmata, and the nervures are conspicuously dotted. In the eastern States and Canada we have at least three closely-allied species of *Cixius*, that I identify as follows :

a. Vertex triangularly and subacutely produced anteriorly, its apex very nearly attaining the base of the front, and almost bisecting the transverse compartment on the apex of the head. Front clypeus and mesonotum black, with the facial carinæ pale. Styles of the males broad, about equalling the pygofers.....*stigmatus*.

—. Vertex obtusely rounded before, not nearly attaining the base of the front, transverse compartment much less narrowed at the middle. Styles of the male distinctly shorter than the pygofers.....b.

b. Larger, piceous brown, becoming blackish on the front, sides of the mesonotum, and on the abdomen. Elytra with very faint brownish clouds, or almost transparent, with dotted nervures.....*pini*.

—. Smaller. Black, with the carinæ more or less pale; elytra more strongly spotted and dotted on the nervures..... ... *colæpium*.

Delphax furcata, Prov. ?—One female taken at Island Lake agrees with Provancher's short description and my former determination of this species, except that the front and vertex are black. It may be a large dark form of *pellucida*, but I believe when the male is placed it will prove distinct.

Lepyronia quadrangularia. Say.—Two from Island Lake, and one very dark example from Fox Island, in Red Cedar Lake.

Aphrophora parallela, Say.—One example from Red Cedar Lake, August 9th.

Aphrophora Saratogensis, Fitch.—One pair taken with the preceding.

Clastoptera obtusa, Say.—Very abundant at all stations. Generally taken on willows. These individuals average much darker than those from New York State.

Clastoptera proteus, Fitch.—This species seems also to have been abundant, especially about Red Cedar Lake. Nearly all the specimens brought home by Mr. Palmer were of the black form. These have only the lower surface of the face and the legs yellow, and the apex of the elytra, and sometimes the base of the costal area, are brownish; a few have two transverse bands on the front of the pronotum, the clavus, except a broad longitudinal median vitta, and an oblique vitta across the middle of the corium, yellow.

Gypona flavilineata, Fitch.—Two females were taken at Red Cedar Lake, August 9th.

Gypona Quebecensis, Prov.—Two males and two females and larvæ were taken at Island Lake and Red Cedar Lake. This species is now generally placed as a synonym of the preceding, but I still think it should be kept distinct, although on further study the name may have to be sunk as a synonym of one of Burmeister's unidentified species. It may be distinguished from *flavilineata* by its smaller size, deeper green colour, longer vertex, more approximate ocelli, more numerous transverse nervures on the elytra, and different form of the last ventral segment of the female. This seems to be a more northern form, which I have taken about Buffalo from Hemlock bushes.

Diedrocephala coccinea, Forster.—Numerous specimens of this insect were brought home by Mr. Palmer. Apparently they were common and generally distributed.

Dræculacephala Novæboracensis, Fitch.—Several were taken at Red Cedar Lake, and one at the Island Lake lumber camp. These specimens are a little smaller, with the black markings of the vertex more distinct than in those captured about Buffalo.

Dræculacephala Manitobiana, Ball.—One male taken at Swamp Creek, August 14th. This individual agrees in all respects with Prof. Ball's figure and description, except that the male plates are distinctly

narrower and more produced, being intermediate in form between his figures representing *Manitobiana* and *Novæboracensis*. He records it from Colorado and Manitoba. This is its first recorded occurrence in the east of which I am aware.

Bythoscopus fenestratus, Fitch.—One strongly-marked female from Island Lake.

Bythoscopus pruni, Prov.—Island Lake lumber camp, August 12th.

Idiocerus Provancheri, Van Duzee.—One individual taken at Island Lake.

Idiocerus suturalis, Fitch, var. *lunaris*, Ball.—Three males and three females are among the material from Island Lake.

Agallia sanguinolenta, Prov —Taken at Island Lake and Red Cedar Lake.

Platymetopius acutus, Say.—Taken at all stations, and apparently common.

Athysanus parallelus, Van Duzee.—One male taken at Island Lake.

Athysanus vaccinii, Van Duzee.—Red Cedar Lake. I have taken this species at Hamburg and Lake Placid, N. Y.; Woodbine, N. J.; and in Colorado.

Athysanus striatulus, Fallen.—Swamp Creek, August 14th. One pale example that I believe should be referred here as this species is identified by Osborn and Ball.

Scaphoideus immistus, Say.—Island Lake. One example.

Thamnotettix eburata, Van Duzee.—Mr. Palmer brought home a good series of this northern species, taken at all localities where he collected. Since describing this species in 1889 I have seen but one additional specimen, taken by Mrs. Slosson, near Lake Champlain.

Thamnotettix, sp.—One example from near Island Lake.

Thamnotettix subcupreus, Prov.—Apparently not at all rare at Island Lake. I have recently taken it as far south as Cape May, N. J.

Thamnotettix waldana, Ball.—One male and four female examples from Swamp Creek, August 14th. These agree well with Prof. Ball's description, but two individuals are a little darker and more clearly marked, with almost the entire length of the claval nervures, and some interruptions on the discal nervures of the corium white.

Thamnotettix inornata, Van Duzee.—One example taken on Fox Island, Red Cedar Lake.

Thamnotettix Smithii, Van Duzee.—One female from Swamp Creek. This example agrees in every essential particular with my description of

the male. Unfortunately the tip of the abdomen has been so compressed it is impossible to describe exactly the form of the last ventral segment, but apparently it is short and truncated or feebly rounded behind, without a median notch; the pygofers are long, yellowish, with the narrow margins and the oviduct deep black. The yellow margin of the connexivum is narrower than in the male.

Cicadula 6-notata, Fallen.—Island Lake, August 12th.

Cicadula lepida, Van Duzee?—Two females that seem to be pale examples of this species were taken at Island Lake and on Fox Island, in Red Cedar Lake.

Cicadula, sp.—One example from Island Lake.

Gnathodus viridis, Osborn.—One unusually large example from Red Cedar Lake. This has the basal angles of the scutellum infuscated, but does not seem to differ otherwise.

Empoasca atrolabis, Gillette.—One specimen taken at Island Lake, August 12th.

Empoasca unicolor, Gillette. Several from Swamp Creek. I have taken this species at Milan, Ohio, and in numbers at Hamburg, N. Y. It is a little larger and deeper green than *Empoasca obtusa*, Walsh.

Empoasca mali, Le Baron.—A pair of this species is in the material from Fox Island.

Typhlocyba tenerrima, H. S.—Two examples of this European species were taken at Swamp Creek.

Psylla carpini, Fitch.—Island Lake. Three examples. In a revision of this group this name will have to be changed, as it is preoccupied by an European species in the same genus.

Livia, sp.—One specimen, too immature to admit of correct determination.

THE PUPATION OF EUVANESSA ANTIOPA, L.

BY JAMES FLETCHER, OTTAWA.

On the morning of November 8th I was fortunate enough to watch the pupation of a caterpillar of *Euvanessa antiopa*, L. The operation has often been described, but it seems worth while putting another observation on record, which was carefully watched by Mr. Arthur Gibson and myself, from the time the larval skin first burst until the cremaster was firmly

fixed in the silk. The chrysalis first appeared through the black skin as a white dash in the middle of the second thoracic segment. This slit was gradually enlarged by the contortions of the chrysalis, the split running down the body very slowly until the head portion was withdrawn from the skin. After that, by a continuation of laboured expansions and contractions of the body, the skin was gradually worked back until it reached the last segment but one of the chrysalis on the dorsal side; but the head and first segments of the larval skin had then only just passed the tips of the wing-cases on the ventral side. Then the skin was gradually slipped back two more segments on the ventral side, after which the cremaster was withdrawn from beneath the skin and was, evidently with much exertion, slowly pushed up until it reached the pad of silk. Here, immediately it touched the silk, it was worked round and round vigorously, and there was a distinct discharge of a pinkish glutinous liquid, by which the cremastral hooks were apparently cemented into the silk, and which gave a pink tinge to the part where the hooks were attached. I was surprised to see this liquid, and at once asked Mr. Gibson to confirm the observation through a lens, which he did. By the twisting of the body the cast-off skin was now gradually worked off, and the chrysalis continued for about 15 seconds twisting the cremaster into the silk. The whole operation, from the time the skin burst until the chrysalis was attached to the silk, was 12 and 15 seconds, but the chrysalis did not take its permanent hardened form for an hour afterwards, and the thorax remained white and facelike for some hours.

As far as we could observe, there was no grasping of the larval skin between the abdominal segments of the chrysalis, but the moisture with which the whole surface of the new chrysalis was bathed seemed sufficient to hold it to the skin and keep it from falling until the cremastral hooks were worked into the silk.

The larva was one of a belated brood which was collected on Saturday, October 27th. There had been several sharp frosts, and the thermometer was almost at the freezing point when these caterpillars were rescued. The leaves on the willow tree where they were found were mostly frostbitten or ripened to a yellowish colour. When brought into the office, the most of them recovered and fed, but a few were apparently too far starved and died.

Pupation of those which survived took place from Nov. 5th to 12th.

A CASE OF PSEUDOPARASITISM BY DIPTEROUS LARVÆ.

BY WILLIAM A. RILEY, CORNELL UNIVERSITY.

Recently a medical friend, Dr. A. E. Ayler, called my attention to some "worms" which he had found under peculiar conditions.

A patient, an elderly lady of one of the best families, was suffering from a malignant tumor—a melanotic sarcoma—located in the small of the back. The tumor was about the size of a large walnut. On examination the doctor was surprised to find, close to the stalk and between the tumor and the body, some ten or twelve "worms," which were feeding upon the diseased tissues. Although they had irritated and caused a slight hemorrhage, neither the patient or others of the family knew of their presence. Any discomfort which they had caused had been attributed to the sarcomatous growth.

Four of the specimens, which proved to be dipterous larvæ, had been preserved alive. Although they were for three days without food, they pupated, and, about a week later, there emerged two adults of the genus Sarcophaga. From my knowledge of analagous cases I assumed that the species was the common European *S. carnaria*, but on looking the matter up more fully I find that this species does not occur in the United States, and that the references to it "undoubtedly refer to other species, probably several" (Aldrich, Cat. N. Am. Diptera, p. 511). Dr. O. A. Johannsen has kindly examined the flies for me. Unfortunately, the specimens were females, but he states that they probably belong to an undescribed species.

The infestation occurred during the latter part of August. It is probable that the adult was attracted by the odour of the discharges, and deposited the eggs or living maggots upon the diseased tissues. This might readily be accomplished so quickly as to completely escape notice.

A number of analagous cases of larvæ of *Musca erythrocephala*, and of *Sarcophaga carnaria* infesting the nasal passages, the auditory meatus, or open wounds, are to be found in medical literature. Kuchenmeister (Manual of Parasites, Eng. trans., 1857, Vol. 2, p. 98) states that in malignant inflammation of the eyes the larvæ of these two species even nestle under the eyelids, and, in Egypt, for example, produce a very serious addition to the effects of smallpox upon the cornea.

GEOMETRID NOTES.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

The genus Trichodezia, Warren, established in 1895 (Nov. Zool. 11, Part 2, page 119), will now contain *two* of our species. In a former paper (CAN. ENT., Vol. 38, p. 38) I stated that *Euchœca albovittata*, Guen., should, as Mr. Warren placed it, be recognized as the type of this genus, and ventured to predict that *Euchœca Californiata*, Pack., would go with it. Since then, through the kindness of Mr. Beütenmuller, of the Amer. Museum of Nat. History, N. Y., I have received a male of this species, and find the peculiar generic characters present. These principal characters are the venation of the hind wings and the peculiar brush of upturned hairs upon the under side above the inner margin, and near the base of the primaries in the male. In an arrangement of the genera, it will find a natural position somewhat remote from *Euchœca*. Many other genera contain material as widely variant. *Orthofidonia*, with *exornata*, Pack., as its type, is an instance, for *semiclarata*, Walk., and *vestaliata*, Guen., which Dr. Hulst places under it, while closely related to each other, are not congeneric with *exornata*.

Mr. Edward Meyrick, in his "Classification of the Geometrina of the European fauna, 1892," was closely followed and frequently quoted by Dr. Hulst in 1896. Mr. Meyrick says: "The constant and uniform anastomosis of veins 9, 10 and 11 of fore wings also affords a very distinctive feature, equally absolute, ... it has the effect of producing a constant auxiliary cell," which he terms the areole. While this may be true of the European Geometridæ, our species seem less stable in their structure. In treating some time ago of the genus Nyctobia, Hlst. (CAN. ENT., Vol. 36, p. 210), I pointed out the variation in number of accessory cells in the wing of *N. limitaria*. Walk., and the inconsistency prevails, it seems, in other members of the Lobophora group. My attention was called to this fact by Mr. J. A. Grossbeck, who in an endeavour to identify some material, with specimens of *Philopsia nivigerata* = *canavestita*, Pears., in the Hulst collection, found the cells variable in

the individuals there gathered. One had a single cell, the other two had two cells each.

Now, the only point in which the genus *Philopsia*, Hulst, differs from *Talledega*, Hulst, is in the number of accessory cells, and as these have proven inconstant in other material which I have examined, it follows that one of these genera must fall.

Philopsia having priority of page, though not of date, will stand, and *Talledega* becomes a synonym of it, the species under it being transferred to *Philopsia*.

In support of this view, I will state that last spring I received from Middle California several specimens, which I at once supposed to be dark, well-marked individuals of *canavestita*, but on a close examination I found they all had *two* accessory cells, and, therefore, must go into *Talledega*. I had seen a single specimen from the same region among material sent me by Dr. Barnes, and I came near describing them as new, but the key to the trouble was in the variable accessory cell, and its solution works out the change I have indicated.

BOOK NOTICE.

GLI INSETTI, LORO ORGANIZZAZIONE, SVILUPPO, ABITUDINI E RAPPORTI COLL UOMO.—By Prof. Antonio Berlese, Director of the Royal Station for Agricultural Entomology in Florence. Milan, Societa Editrice Libraria, 1906. Published in parts at one lire each.

With such excellent recent general American books on insects as those of Kellogg and Folsom, it would seem difficult for a book in a foreign language to meet any great demand in this country, yet the excellent work of Professor Berlese, of which seventeen parts have already been published, will undoubtedly prove a very important addition to the libraries of all institutions in which advanced morphology is being studied, and in all laboratories in which the study of insects is undertaken from any point of view.

Berlese is a master, a man of broad ideas, thorough training, admirable in technique, clear in demonstration, an excellent writer, and a capable draftsman. His work when completed will be both sound and comprehensive. It will comprise two volumes, of which the first will in a

general way contain the anatomy and the second the biology of insects. The first volume will consist of from seven to eight hundred pages, and will be accompanied by about one thousand figures. Of these, 550 pages have been published in seventeen parts, and the printed parts contain six hundred figures and four plates.

The subjects considered in the first volume, by chapters, are :

I. Brief history of entomology.
II. Size of insects.
III. Plan of the insect structure.
IV. Embryology in general.
V. Morphology in general.
VI. Exoskeleton.
VII. Endoskeleton.
VIII. Muscular system.
IX. Integument and its structure.
X. Glands.

There still remain to be published chapters on the nervous system and organs of sense, organs of digestion, organs of circulation, organs of respiration, organs of secretion, and sexual organs. In the part already completed the chapters on morphology are marvels of detail and thoroughness. The work itself is a large octavo, and more than ninety pages are devoted, for example, to the study of the exoskeleton of the head, while nearly eighty pages are occupied with the treatment of the muscular system. Nearly all of the numerous and strikingly apt illustrations are original, having been drawn by Dr. Berlese himself. Each section of the work is followed by a very complete bibliography, and the author has shown a perfect knowledge of the work of other men, the publications of American authors having been considered and studied with a thoroughness quite unusual among European authors.

The second volume, which has been reserved for the treatment of the biology of insects, will contain a careful consideration of all questions of economic importance, and it will undoubtedly be of interest to learn from this work Berlese's final views on the subject of parasitism, and especially the relations of insects and birds, upon which point he has long been at odds with other Italian zoologists. L. O. Howard.

Mailed December 10th, 1906.

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